



USAID | **KENYA**
FROM THE AMERICAN PEOPLE



EdData II

The Primary Math and Reading (PRIMR) Initiative Baseline Report

EdData II Technical and Managerial Assistance, Task Number 13
Contract Number AID-623-M-11-00001
Strategic Objective 3
Date: June 2012

This publication was produced for review by the United States Agency for International Development. It was prepared by RTI International.

The Primary Math and Reading (PRIMR) Initiative Baseline Report

Prepared for
Dr. Teresiah Gathenya, Contracting Officer's Technical Representative (COTR), USAID/Kenya
United States Agency for International Development

Prepared by
RTI International
3040 Cornwallis Road
Post Office Box 12194
Research Triangle Park, North Carolina 27709-2194
USA

RTI International is a trade name of Research Triangle Institute.

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

Table of Contents

List of Tables	v
List of Figures	vi
Abbreviations	x
Executive Summary	1
1. Introduction	12
1.1 Objectives of the Baseline Study.....	14
1.2 Significance of the Baseline Study.....	15
2. Research Design and Methodology.....	16
2.1 Regional Selection for the Baseline	16
2.2 Adaptation of EGRA and EGMA Tools	17
2.3 Baseline EGRA and EGMA Subtasks.....	17
2.4 Piloting of Baseline Tools	19
2.5 Sampling.....	19
2.5.1 Public Schools.....	19
2.5.2 Nonformal Schools	21
2.5.3 Characteristics of Assessed Pupils.....	23
2.6 Data Collection.....	25
2.7 Reliability Estimates.....	26
2.7.1 English Tool Analysis.....	26
2.7.2 Kiswahili Tool Analysis	28
2.7.3 Mathematics Tool Analysis	30
3. Early Grade Reading Assessment (EGRA) Results	32
3.1 English and Kiswahili Letter Fluency	34
3.2 Nonword Oral Fluency in English and Kiswahili	35
3.3 Oral Reading Fluency.....	36
3.3.1 Reading Fluency in English and Kiswahili.....	36
3.3.2 Reading Fluency in English and Kiswahili by Sex and Class	38
3.3.3 Reading Fluency in English and Kiswahili by Cohort and Region	40
3.4 Reading Comprehension in English and Kiswahili.....	43
3.5 Summary of Findings on Oral Reading Fluency and Comprehension.....	48
4. Early Grade Mathematics Assessment (EGMA) Results	50
4.1 Rational Counting.....	50

4.2	Number Identification	52
4.3	Quantity Discrimination	53
4.4	Missing Number	54
4.5	Addition, Levels 1 and 2	55
4.6	Subtraction.....	57
4.7	Word Problems.....	59
5.	SSME Results.....	62
5.1	Classroom Observations.....	62
5.2	Classroom Characteristics	72
5.3	Teacher Interview Results.....	77
5.4	Head Teacher Interview Results.....	88
6.	Comparative Analyses.....	98
6.1	Predictive Analyses	98
6.2	Reading Fluency vs. Other Outcomes	102
6.3	Reading Assessment Outcomes vs. Selected SSME Data	110
6.3.1	Class.....	110
6.3.2	School Shifts	112
6.3.3	Multigrade Classrooms	113
6.3.4	Order of Assessment.....	113
6.3.5	Total vs. Attempted.....	114
6.3.6	School-Level Means	115
6.4	Reading Fluency vs. Comprehension in Two Languages	116
6.5	Fluency Thresholds and Cut Points.....	118
6.6	Accuracy Rates, by Subtask.....	122
6.7	Responding to PMP indicators	123
7.	Conclusion and Recommendations	125
	References.....	127
	Annex A. Sample Instruments	A-1
	Annex B. Summary Statistics	B-1

List of Tables

Table 1. Sampled zones and schools for PRIMR and sampled schools for baseline.....	20
Table 2. Sampled clusters and schools for PRIMR and sampled schools for baseline	22
Table 3. Learners assessed by class and sex	23
Table 4. Sampled schools and learners by class	24
Table 5. Ages of assessed learners, by class	24
Table 6. Pearson correlations for subtasks in English	27
Table 7. Cronbach’s alpha for the English tool subtasks.....	28
Table 8. Pearson correlations for subtasks in Kiswahili	29
Table 9. Cronbach’s alpha for the Kiswahili tool subtasks	29
Table 10. Pearson correlation for subtasks in mathematics.....	30
Table 11. Cronbach’s alpha for the mathematics tool subtasks.....	31
Table 12. English subtask results for all learners	32
Table 13. Kiswahili subtask results for all learners	33
Table 14. Kiswahili and English letter fluency.....	34
Table 15. Timed reading fluency in Kiswahili and English, by class and sex	38
Table 16. Untimed reading fluency in Kiswahili and English, by class and sex.....	39
Table 17. Summary results, by cohort	40

List of Figures

Figure 1. Map of Kenya	16
Figure 2. Performance of learners by subtasks and language	33
Figure 3. Letter fluency, by class and sex	35
Figure 4. Nonword fluency, by class and sex	36
Figure 5. Comparison of reading fluency in reading subtasks.....	37
Figure 6. Relationship between oral reading fluency in Kiswahili and English.....	38
Figure 7. English nonreaders, by sex, class, and region	39
Figure 8. Reading fluency in English and Kiswahili, by cohort.....	41
Figure 9. Timed English and Kiswahili reading fluency, by region.....	41
Figure 10. Oral reading fluency, by school shift	43
Figure 11. Comprehension scores, by total and attempted	44
Figure 12. Class 2 comprehension scores, by total and attempted	44
Figure 13. Class 1 comprehension scores, by total and attempted	45
Figure 14. Proportion of learners unable to answer one question (timed comprehension)	46
Figure 15. Proportion of learners unable to answer one question (untimed comprehension).....	47
Figure 16. Listening and reading comprehension scores by class and language.....	48
Figure 17. Reading fluency and comprehension by class and language.....	49
Figure 18. Overall scores on rational counting	51
Figure 19. Means for rational counting, by region	52
Figure 20. Number identification scores, by region, sex, and class.....	53
Figure 21. Distribution of number discrimination scores	54
Figure 22. Missing number scores by sex, class, school type, and cohort.....	55
Figure 23. Summary of addition results, levels 1 and 2.....	56
Figure 24. Strategies used by learners in addition levels 1 and 2 problems	56
Figure 25. Summary of subtraction fluency results, levels 1 and 2.....	58
Figure 26. Strategies used by learners in subtraction levels 1 and 2	58
Figure 27. Learners with zero scores on addition and subtraction subtasks.....	59
Figure 28. Frequency distribution of scores for the word problem subtask	60
Figure 29. Word problem scores disaggregated by sex, class, location, and cohort	61
Figure 30. Number of reading and maths classroom observations, by county	62
Figure 31. Frequency of various instructional methods in English class	63
Figure 32. Frequency of various instructional methods in Kiswahili class	63
Figure 33. Frequency of various instructional methods, maths	64
Figure 34. Language usage in Class 1 and Class 2, by subject.....	65
Figure 35. Language use, by county	66
Figure 36. Teacher focus during classroom observations.....	67
Figure 37. Teacher focus on whole-class instruction.....	67

Figure 38. Instructional content in language classes	68
Figure 39. Instructional content in maths classrooms.....	69
Figure 40. Teacher actions during language observations.....	70
Figure 41. Teacher actions during maths observations.....	70
Figure 42. Pupil actions during language observations	71
Figure 43. Pupil actions during maths observations	71
Figure 44. Numbers of children in attendance in each classroom, by location	72
Figure 45. Materials used in language classrooms	73
Figure 46. Facilities available in the observed schools.....	74
Figure 47. Ratio of pupils to textbooks, English	75
Figure 48. Ratio of pupils to textbooks, Kiswahili	75
Figure 49. Ratio of pupils to textbooks, maths	76
Figure 50. Highest classes taught in observed schools	76
Figure 51. Distribution of teachers’ ages	77
Figure 52. Experience levels of teachers, formal and nonformal schools	78
Figure 53. Frequency of TAC or other tutor visits, nonformal schools.....	79
Figure 54. Distance traveled by teachers to their school	79
Figure 55. Comprehension gaps between listening and reading.....	80
Figure 56. Changes in comprehension gap over time, Classes 1 and 2	81
Figure 57. Number of days of teacher in-service training in past 3 years	81
Figure 58. Teachers’ assessment of how frequently they use a textbook.....	82
Figure 59. Preparation of schemes of work in English.....	83
Figure 60. Preparation of schemes of work in Kiswahili.....	83
Figure 61. Preparation of schemes of work in maths.....	84
Figure 62. Overall proportion of lesson plans considered “well prepared”	84
Figure 63. Status summary of lesson plans, English	85
Figure 64. Status summary of lesson plans, Kiswahili	85
Figure 65. Status summary of lesson plans, maths	86
Figure 66. Proportion of schemes of work and lessons plans judged “well prepared”	86
Figure 67. Pupils’ average reading fluency rates in English, by formal/nonformal and teacher’s qualification level	87
Figure 68. Pupils’ average reading fluency rates in Kiswahili, by formal/nonformal and teacher’s qualification level	88
Figure 69. Head teacher qualifications	88
Figure 70. Head teacher qualifications, by county	89
Figure 71. Allocation of head teacher hours spent at school, per week.....	90
Figure 72. Head teachers’ self-reports of training received.....	91
Figure 73. Head teacher levels of support and satisfaction with teacher performance.....	92
Figure 74. Responsibility for reviewing lesson plans	92
Figure 75. Frequency of PTA meetings in the past year.....	93

Figure 76. Rates of head teacher absence and school closures.....	94
Figure 77. Teachers’ opinions of appropriate timing for beginning to use English as language of instruction.....	95
Figure 78. Comparison of head teachers’ estimates of Kiswahili usage as LOI vs. observed usage.....	95
Figure 79. Frequency of classroom observations by head teachers.....	96
Figure 80. Frequency of lesson plan reviews by various supervisors.....	97
Figure 81. Average numbers of teachers absent or late on the day of assessment.....	97
Figure 82. Significant predictors for pupil outcomes on Kiswahili EGRA.....	99
Figure 83. Significant predictors for pupil outcomes on English EGRA.....	100
Figure 84. Significant predictors for pupil outcomes on maths assessments.....	102
Figure 85. Mean fluency rates in Kiswahili vs. English (school averages).....	103
Figure 86. Scatterplot of 2011 mean KCPE vs. average English fluency scores.....	104
Figure 87. Scatterplot of 2011 mean KCPE vs. average Kiswahili fluency scores.....	104
Figure 88. Reading fluency and comprehension results.....	105
Figure 89. Kiswahili oral reading fluency rates, timed vs. untimed.....	106
Figure 90. English oral reading fluency rates, timed vs. untimed.....	106
Figure 91. Kiswahili timed reading comprehension vs. fluency scores.....	106
Figure 92. Kiswahili untimed reading comprehension vs. fluency scores.....	106
Figure 93. English timed reading comprehension vs. fluency scores.....	107
Figure 94. English untimed reading comprehension vs. fluency scores.....	107
Figure 95. Kiswahili oral reading fluency results, Classes 1 and 2.....	108
Figure 96. English oral reading fluency results, Classes 1 and 2.....	108
Figure 97. Average Kiswahili oral reading fluency, timed vs. untimed.....	109
Figure 98. Average English oral reading fluency, timed vs. untimed.....	109
Figure 99. Average English reading comprehension, timed vs. untimed.....	109
Figure 100. Average Kiswahili reading comprehension, timed vs. untimed.....	109
Figure 101. Boys’ and girls’ average EGRA subtask scores, English and Kiswahili.....	110
Figure 102. Learning outcomes for Class 2 (differences between Class 1 and Class 2).....	111
Figure 103. Ages of sampled learners, by class, formal schools.....	112
Figure 104. Ages of sampled learners, by class, nonformal schools.....	112
Figure 105. Average oral reading fluency scores, by school shift.....	113
Figure 106. Effect of multigrade classrooms on oral reading fluency, nonformal schools.....	113
Figure 107. Average oral reading fluency and addition results, by order of assessment.....	114
Figure 108. Percentage difference between attempted and total scores, timed and untimed passages, English and Kiswahili, Classes 1 and 2.....	115
Figure 109. School-level mean oral reading fluency, by location, Kiswahili.....	116
Figure 110. School-level mean oral reading fluency, by location, English.....	116
Figure 111. Kiswahili fluency and comprehension scores across multiple assessments, timed and untimed subtasks, for benchmarking.....	117

Figure 112. English fluency and comprehension scores across multiple assessments, timed and untimed subtasks, for benchmarking	118
Figure 113. Percentage of learners in each fluency threshold, Kiswahili, by class	118
Figure 114. Percentage of learners in each fluency threshold, English, by class	120
Figure 115. Percentage of learners in each fluency threshold, English, by location	120
Figure 116. Distribution of oral reading fluency scores, Kiswahili, Class 2	121
Figure 117. Distribution of oral reading fluency scores, English, Class 2	121
Figure 118. Proportion of learners at all Kiswahili fluency thresholds, all classes and locations	121
Figure 119. Proportion of learners at all English fluency thresholds, all classes and locations	122
Figure 120. Accuracy rates by language and subtask, Class 2	123
Figure 121. Disaggregated proportions of children reading with 80% comprehension	124

Abbreviations

apm	addition problems per minute
ASAL	Arid and Semi-Arid Lands
CSO	civil society organization
ECDE	Early Childhood Development and Education
EFA	Education for All
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
FPE	Free Primary Education
ICT	information and communication technology
IRB	Institutional Review Board
KCPE	Kenya Certificate of Primary Education
KEMI	Kenya Education Management Institute
KESSP	Kenya Education Sector Support Programme
KIE	Kenya Institute of Education
KISE	Kenya Institute of Special Education
KEMRI	Kenya Medical Research Institute
KNBS	Kenya National Bureau of Statistics
KNEC	Kenya National Examinations Council
LOI	language of instruction
MDG	Millennium Development Goal
MGC&SD	Ministry of Gender, Children, and Social Development
MOE	Ministry of Education
NASMLA	National Assessment Systems for Monitoring Learner Achievement
NCST	National Council of Science and Technology
NFEI	Nonformal Education institution
NGO	nongovernmental organization
ORF	oral reading fluency
PMP	Performance Monitoring Plan
PRIMR	Primary Math and Reading Initiative
PTA	parent–teacher association
RTI	RTI International (trade name of Research Triangle Institute)
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SAGA	Semi-Autonomous Government Agency
SMC	school management committee
SSME	Snapshot of School Management Effectiveness
TAC	Teachers’ Advisory Centre
TSC	Teachers’ Service Commission
USAID	United States Agency for International Development
wpm	words per minute

Executive Summary

Can Kenyan children read? Can they comprehend? Is Kiswahili or English easier to learn to read? Do Kenyan children have basic Maths skills? Can reading and Maths skills be improved? These are the questions addressed by the Primary Math and Reading (PRIMR) Initiative, a USAID-funded research program being carried out during 2011–2014.

The baseline assessment described in this report was a collaboration among the Kenyan National Examinations Council (KNEC), Kenya Institute of Education (KIE), Kenya Education Management Institute (KEMI), Kenya Institute of Special Education (KISE), Teachers’ Service Commission (TSC), Ministry of Education (MOE), and USAID. This report presents the baseline findings on the current status of Kiswahili, English, and maths skills for children in Class 1 and 2 in 220 schools randomly selected from the 500 PRIMR schools. Each child was assessed in all three subjects as well as being given a background questionnaire. The pupils’ classrooms were observed in both reading and maths, and their teachers and head teachers were interviewed. The pupil assessments included a variety of subtasks, including letter sound fluency, nonword fluency, oral reading fluency, reading comprehension, and listening comprehension. The sampling included 4,385 pupils, for more than 13,000 individual assessments.

Data Collection

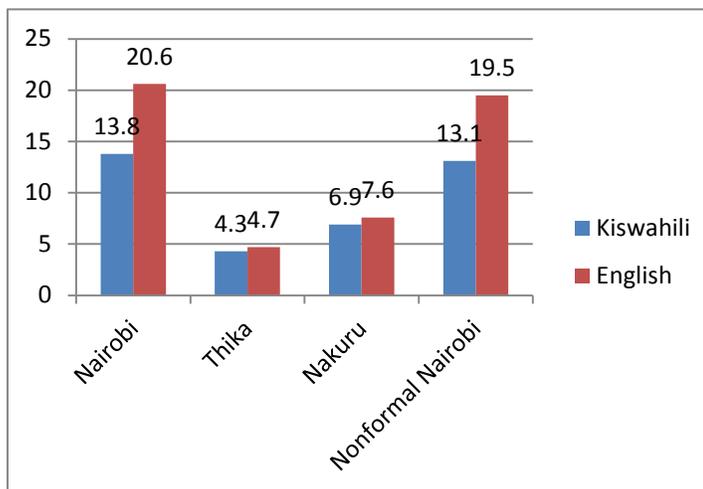
Data collection took place in Nairobi, Central province, and Rift Valley province; and in nonformal educational institutions (NFEIs) in informal settlements, 9–27 January 2012. The sample is summarized in Table ES-1. It shows that 4,385 children were assessed in all three subjects in 220 schools, from Class 1 (2,192 pupils) and Class 2 (2,193 pupils), in a gender-balanced fashion (2,186 girls and 2,199 boys).

Class	Girls	Boys	Totals
1	1,085	1,107	2,192
2	1,101	1,092	2,193
Total	2,186	2,199	4,385

Reading Findings

Reading outcomes remained undesirably low in sampled schools. Figure ES-1 shows the average oral reading fluency scores for children in the four locations in which PRIMR operates. Three points are worth emphasizing. First, fluency rates were higher in English than they were in Kiswahili, meaning that children were reading more fluently in English, regardless of

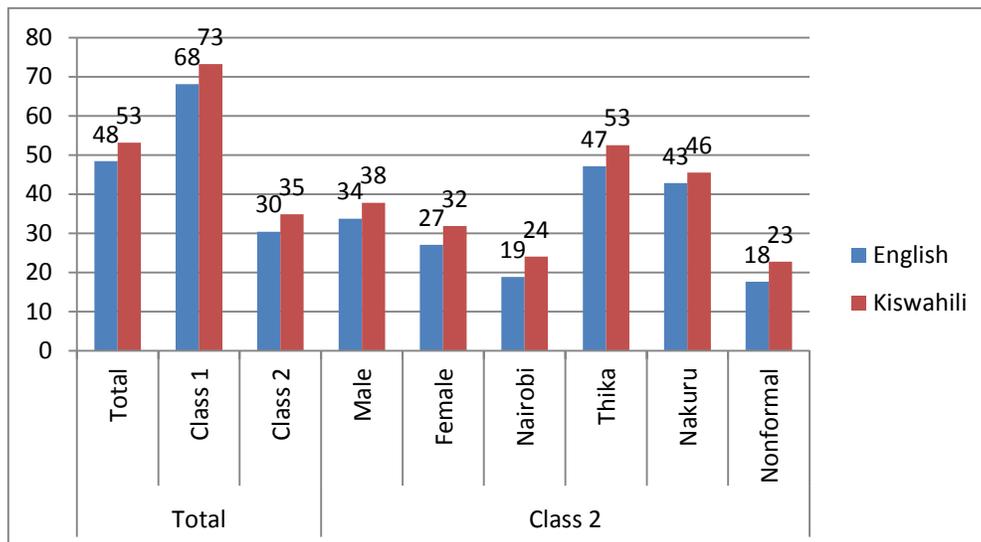
Figure ES-1. Average oral reading fluency scores, by location



location. Second, even the more fluent readers in Nairobi were very far away from the MOE’s draft benchmark fluency rates of 65 words per minute in Kiswahili and 100 words per minute in English. Third, there were no statistical significant differences between the fluency rates of children in NFEI and public schools in Nairobi. In other words, whether children attended a typical public school in Nairobi or whether they attended a low-cost private, NFEI school serving the informal settlements in the poorer parts of town, fluency rates were similar, and in both cases, much higher than in Thika or Nakuru.

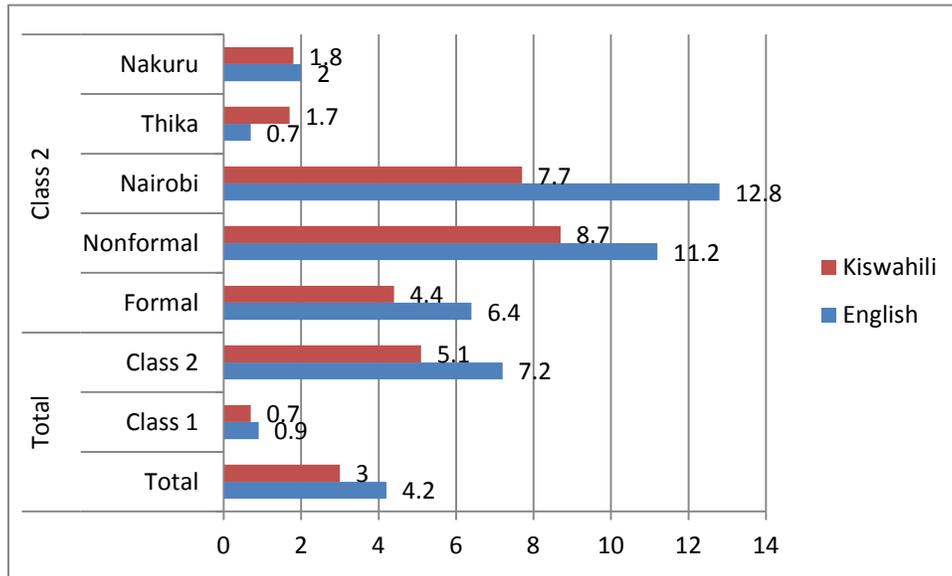
Figure ES-2 shows the percentages of children who were unable to read a single word of a Class 1 passage of text. The bars to the right show the percentages for children in Class 2 only, by sex and by location. Note that in Thika and Nakuru, more than 40% of children in Class 2 could not read a single word in either Kiswahili or English. And in Nairobi, between 19% and 24% of children could not read a word.

Figure ES-2. Percentage of children unable to read a single word of Class 1 text



What about those who *could* read? Given that Kenya typically outperforms its neighbors on reading and Maths examinations (for example, those of the Southern and Eastern Africa Consortium for Monitoring Educational Quality [SACMEQ]), what percentages of children are reading at sufficient levels of fluency? Using very modest fluency rates of 65 wpm in English and 45 wpm in Kiswahili, Figure ES-3 shows the proportion of children reaching the MOE’s benchmark fluency rates for comprehension. It shows that some children could read at the expected levels, but that even in Class 2 in Nairobi, less than 13% of children could read English fluently, and less than 8% of children could read Kiswahili fluently. On average, across Class 2, only 5.1% and 7.2% of children could read Kiswahili and English fluently, respectively. Those that could be considered truly reading, therefore, are a small percentage of the population.

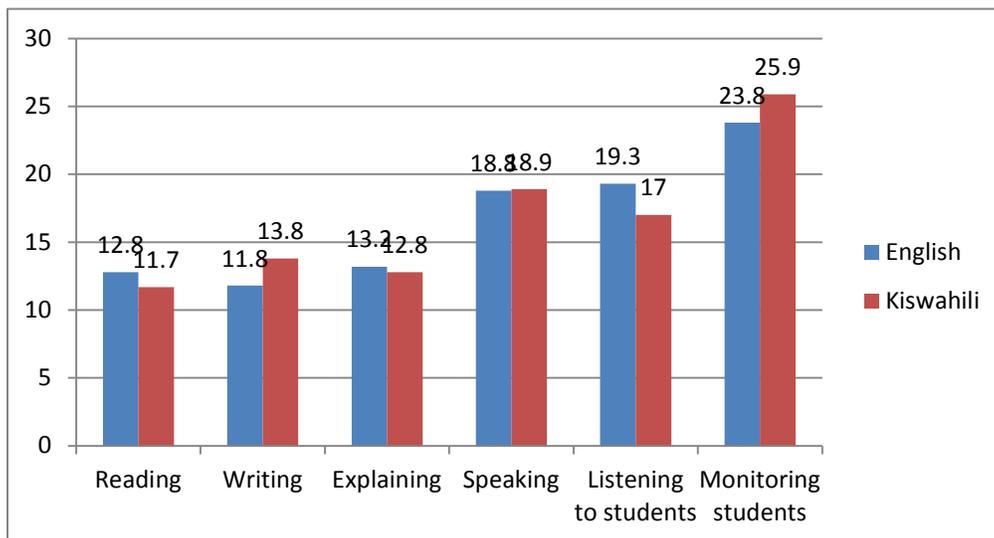
Figure ES-3. Percentage of children reaching benchmark fluency rates



Instruction Findings

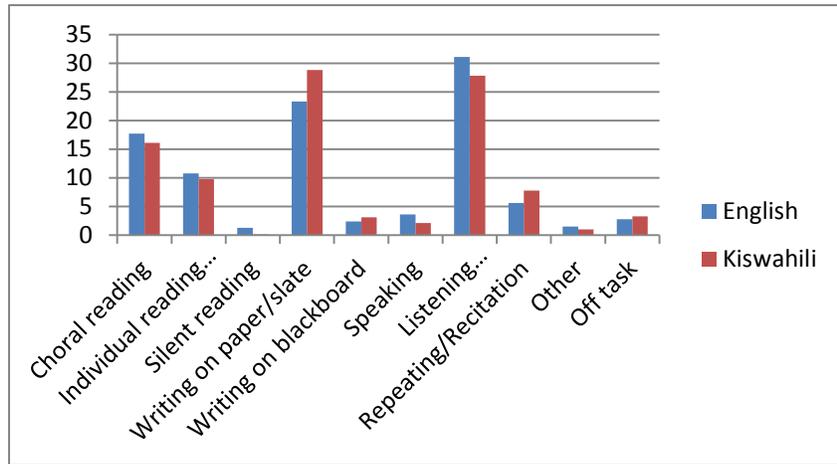
The assessment of reading outcomes was accompanied by several classroom observations. We observed both Kiswahili and English classrooms to determine what teachers were doing during lessons. Figure ES-4 shows that the predominant activities by teachers were monitoring pupils (usually as they did work at their desks), listening to pupils, speaking, and explaining. Less than 13% of instructional time in both Kiswahili and English was actually spent in reading. This suggests that teachers primarily use the language class as a time to teach informational content, rather than to support the skills of reading and improving reading outcomes.

Figure ES-4. Teacher actions during language observations



We also observed what pupils were doing. Figure ES-5 shows that the predominant activities were listening to and watching the teacher, writing on paper, and choral reading. Individuals reading and silent reading together were less than 12% of observations in both English and Kiswahili. Given that the time on the curriculum timetable for

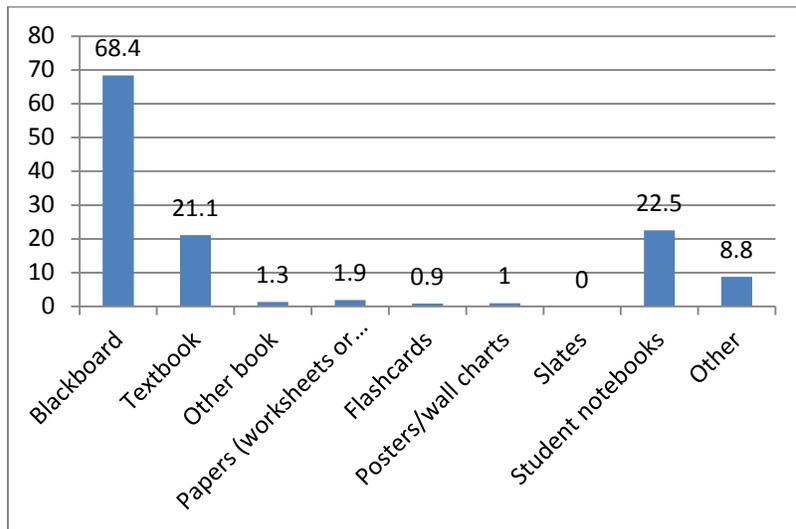
Figure ES-5. Learner actions during language observations



both reading and maths is 30 minutes, with 12% of instruction spent with children reading, we would expect 3.6 minutes per day with children reading. This is in contrast to Uganda, which spends 90 minutes a day on literacy, Ethiopia which provides 45 minutes, and the United States and United Kingdom, where in most classrooms, between 60 and 90 minutes per day are allocated to teaching reading and to ensuring that all children have the requisite skills to learn how to read. Note that in Kiswahili, none of our 206 observations had any time allocated for the silent reading that research shows is essential for children to have had enough practice to master the skill of individual reading and associated comprehension.

The materials used across these hundreds of observations were also observed. Figure ES-6 shows that the predominant materials used were the blackboard (68.4%) and pupil notebooks (22.5%), and the textbook (21.1%). Note that these observations looked at the total usage, not the percentage of lessons using these materials, as nearly all of them use these materials at some time. These findings show more than two thirds of

Figure ES-6. Materials used



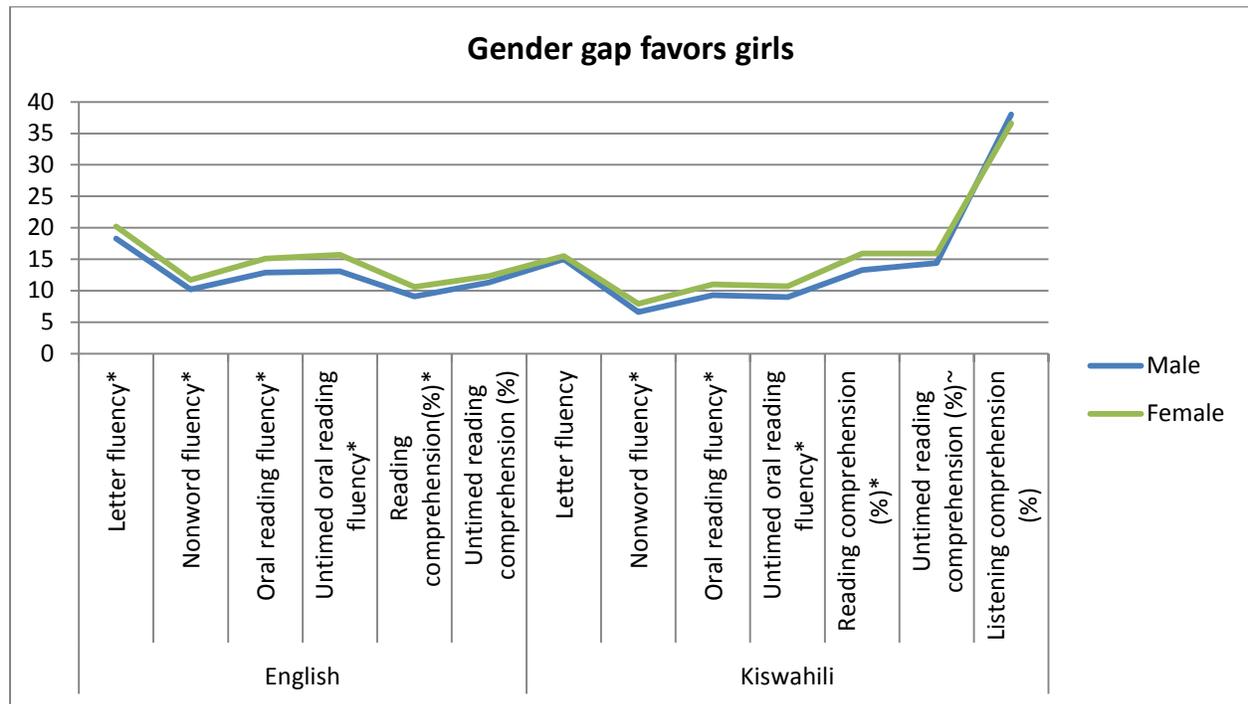
time was actually spent using the blackboard. We expected the percentage of time spent using a textbook to be higher than 21.1%. We were also surprised to find that only 1.3% of the time were any other books used in the classroom. In Kenya, then, the textbook is what is driving

instruction, and any reading improvements should focus on improving the textbook, not providing other books that would seldom be used at all.

Gender Gap Favours Girls

The evidence from the EGRA study showed a consistent, if small, advantage for learning outcomes for girls. Figure ES-7 shows that for nearly all of our assessed subtasks and for both English and Kiswahili, girls outperformed their boy counterparts in school, for both Class 1 and Class 2. This finding is mirrored in early primary assessments of literacy skills in many parts of the developed world, but it is less likely to occur in the poorest countries of the world. This suggests that, for Kenya, at least in the urban and peri-urban locations on which PRIMR focuses, the major impediments to equal learning for girls in Class 1 and 2 have been overcome, and their natural talents for language, literacy, and learning have been allowed to be exhibited. That should not discount the substantial gains that both boys and girls need to make to have basic literacy skills.

Figure ES-7. Boys' and girls' average EGRA subtask scores, English and Kiswahili



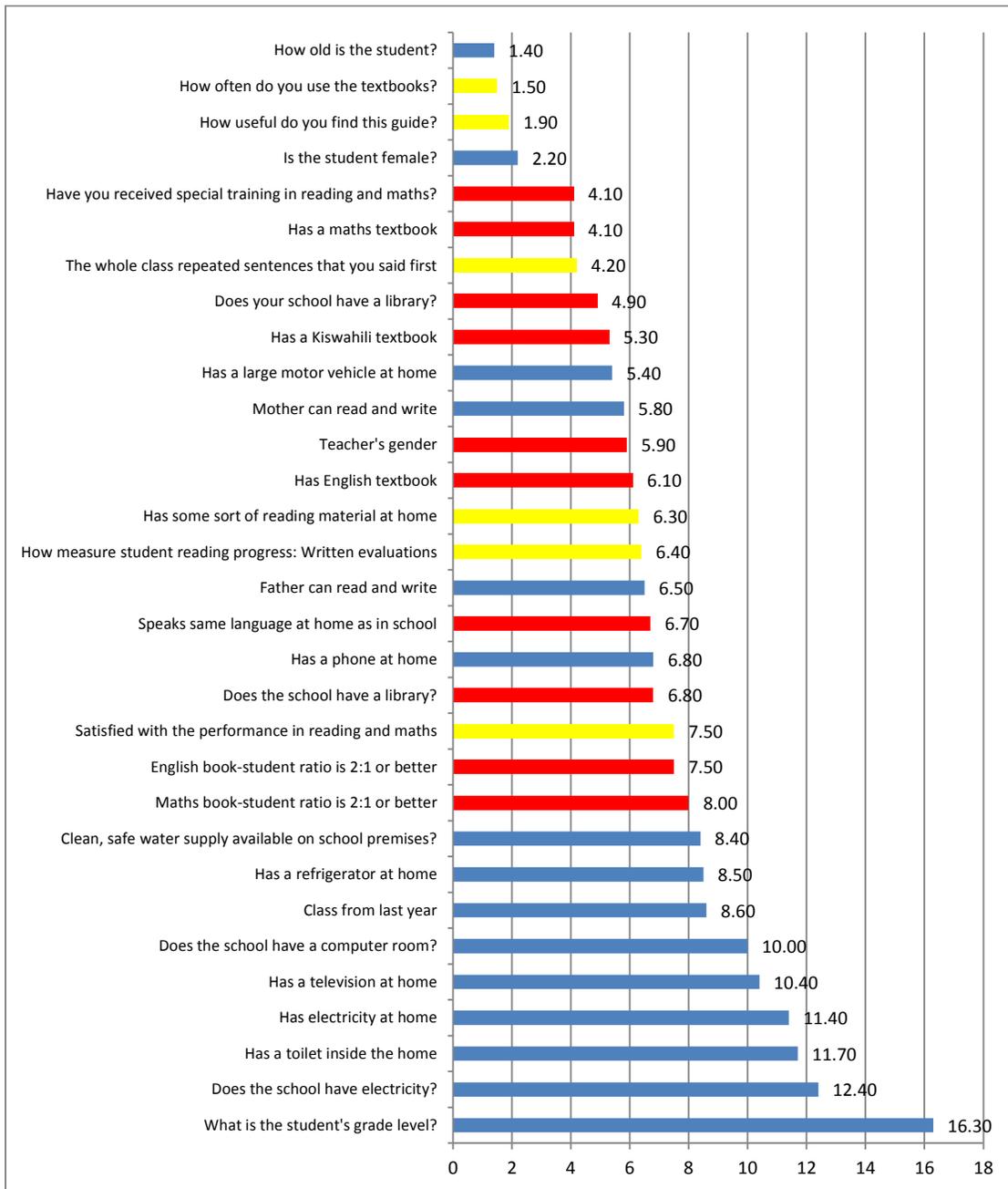
*Statistically significant

~ Significant at .10 level

Significant English Predictors

The PRIMR baseline data set allowed for analysis to investigate the relationships between pupil, classroom, and school variables and pupil outcomes. Figure ES-8 shows the word-per-minute correlations between predictors and English fluency. The blue bars indicate areas where the predictor has a positive relationship with English fluency but where the predictor is out of the control of the school, teacher, and system. The red bars indicate that the predictor is a school system variable, such as the additional 4.1 words per minute if the teacher received special training in reading or maths, and the 4.9 words per minute for a school library. The yellow bars are the classroom instruction predictors that were statistically significant, particularly using the textbooks often (1.5 wpm), finding the teachers' guide useful (1.9 wpm), repeating sentences (4.2 wpm), having reading materials at home (6.3 wpm), using written assessments to measure reading progress (6.4 wpm), and focusing on performance in reading and maths (7.5 wpm).

Figure ES-8. Significant predictors for pupil outcomes on English EGRA

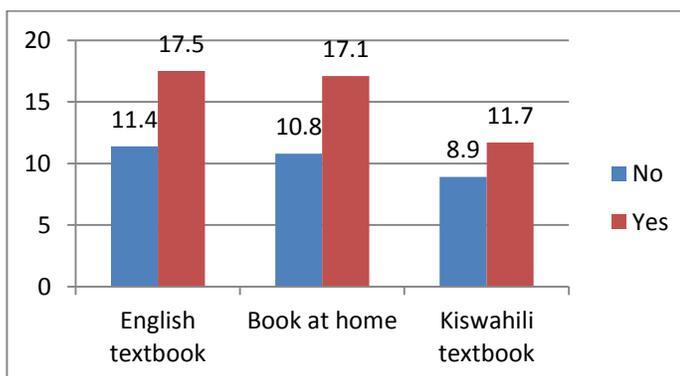


Fluency Rates by Reading Materials

The EGRA data set provides a good deal of information about the access to reading materials for children in PRIMR-supported schools. It is not sufficient to note only that children do not have sufficient access to books. The findings, presented in Figure ES-9, show significant differences in Kiswahili and English outcomes for children with access to those

books. The magnitude of those differences is quite large, with possession of an English textbook increasing fluency scores by 6.1 wpm, having a Kiswahili textbook increasing scores by 2.8 wpm, and having any books at home increasing fluency scores by 6.3 wpm. These gains are statistically remarkable and point to the importance of having access to reading materials. The cost pays off, especially given that we found most children did not have access to books at a 1:1 ratio.

Figure ES-9. Fluency rates and access to reading materials

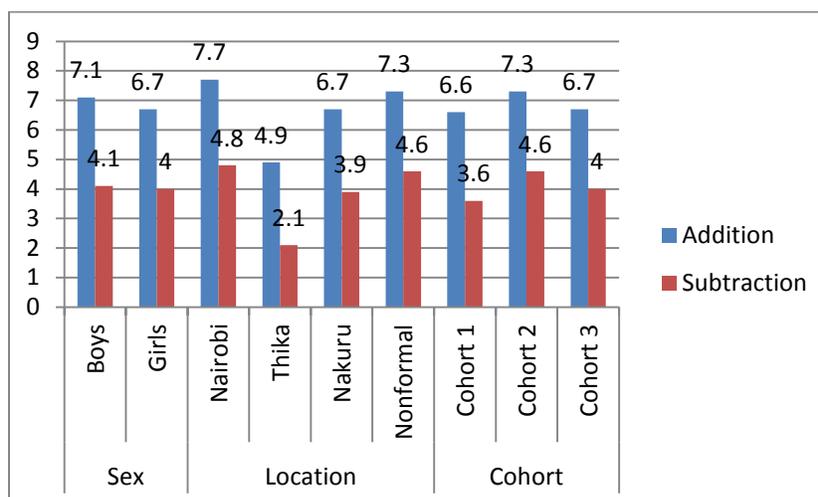


Maths Findings

Figure ES-10 shows that the average fluency rates for basic addition and subtraction problems for children in Class 2 were quite low. In all comparisons, children did much better in addition than subtraction. The same county-level comparisons held in maths as in reading, with Nairobi and nonformal

outpacing Thika and Nakuru. Unlike in some of the reading subtasks, boys slightly outperformed girls, and Cohort 2 did better than both Cohort 1 and Cohort 3. Most importantly, we found that on average, the children in our sample could solve one addition problem every 9 seconds, and one subtraction problem around every 15 seconds. These are very slow rates, and show that the majority of children did not have consistent strategies for solving these problems.

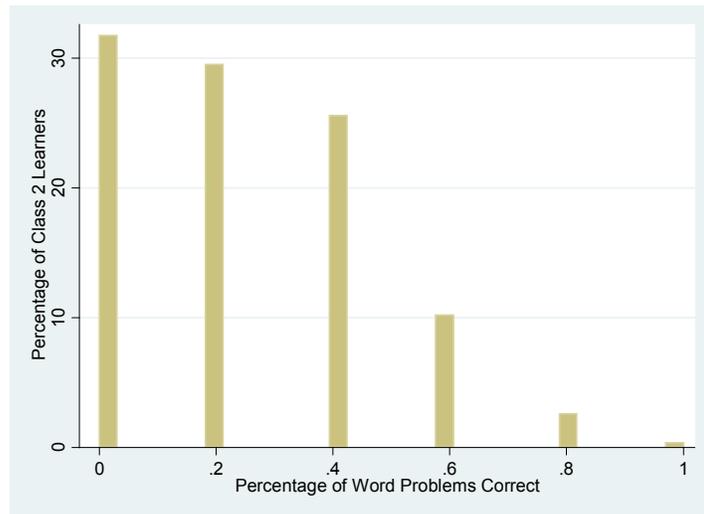
Figure ES-10. Maths fluency, Class 2



For word problems, the study found that the overall mean in Class 1 was 13.6% correct, with Class 2 at 24.8%. The distribution of scores in Class 2 is presented in Figure ES-11. It shows that, even in Class 2, 32.3% could not answer a single word problem, whether it was posed in English or in Kiswahili. On the other end, only 3.7% of the Class 2 sample scored higher than

60% on the word problems. The vast majority of children used inefficient strategies to solve these word problems, even though counters were provided. These issues reiterate the dire need to develop instructional approaches that help pupils not only understand basic maths principles, but also apply effective strategies of solving maths problems quickly and accurately.

Figure ES-11. Distribution of scores on word problems, Class 2



Recommendations

The PRIMR baseline findings present several important recommendations, which have been discussed in some detail with USAID/Kenya and the Ministry of Education. The recommendations include the following:

- **Implement balanced literacy instruction.** Kenyan children have difficulty identifying letters and their relationship with sounds. They also struggle in understanding what they read, even after they manage to identify a few words. Therefore, we recommend that the MOE focus on a balanced literacy program that allows children to increase their phonemic awareness, alphabetic principle, fluency, vocabulary, and reading comprehension skills.
- **Focus specifically on teaching reading.** The findings of the EGRA study and the classroom observations make it very clear that not enough time is spent teaching reading in Kenyan classrooms. Much more time is spent on grammar, with insufficient time with textbooks and no time with reading materials. This is an issue for the curriculum, but also for the quality of instruction in language classrooms.
- **Improve access to reading material.** The convincing evidence that access to reading materials improves reading outcomes suggests that Kenya should consider significant investments in ensuring that each Kenyan pupil has access to reading textbooks and supplementary reading materials. PRIMR believes that these investments can be made at relatively low cost if radical decisions are made about the importance of reading materials for every child. More importantly, the government should support families' efforts to make reading a significant part of daily activities.
- **Set literacy benchmarks.** The PRIMR baseline data and data from previous reading assessments should be used to set benchmarks for literacy outcomes. Previous work on this was undertaken in March 2011, and it should be expanded to guide interventions in reading improvement.

- **Evaluate reading interventions.** Several reading interventions exist in Kenya currently. We recommend that the evidence from internal and external reading interventions in Kenya be examined so that the data can be combined to design a reading intervention at scale in Kenya.
- **Focus on teaching numbers as quantities.** Helping pupils make the link between numbers as mathematical symbols and the quantities they represent prepares children for higher-level maths operations. It also ensures that children are able to apply the basic maths skills they possess.
- **Teach children effective maths problem-solving strategies.** The poor results in addition, subtraction, and word problems can be attributed to inefficient problem-solving strategies. Most pupils use traditional methods of fingers and tick marks, which are prone to errors and consume time.
- **Address gender issues in early instruction.** These results showed that girls outperformed boys in reading and in some maths subtasks, and that some subtasks revealed no differences by gender. It is encouraging that girls are likely to perform at their natural capabilities at the early levels. The MOE should ensure that teachers have strategies for addressing the learning needs of boys and girls. In particular, poor attitudes towards maths can be addressed and improved at this early level in school.

For reference, Table ES-2 summarizes the complete findings of the assessment by class.

Table ES-2. PRIMR baseline findings by class: English, Kiswahili, and mathematics

	Subtask	Class	Mean	Std. dev.	Std. error	Min.	Q1	Median	Q3	Max.	Lower CI	Upper CI
English	Letter fluency	1	18.35	17.93	1.50	0	0	14	30	81	15.28	21.41
		2	19.97	18.59	1.36	0	0	16	32	91	17.19	22.76
	Nonword fluency	1	6.36	9.77	0.69	0	0	0	12	50	4.95	7.78
		2	14.92	13.62	0.91	0	0	14	25	50	13.06	16.78
	Oral reading fluency	1	5.17	11.36	0.67	0	0	0	4	57	3.80	6.55
		2	19.83	19.65	1.42	0	0	14	37	59	16.93	22.73
	Reading comprehension	1	0.16	0.57	0.02	0	0	0	0	5	0.11	0.21
		2	0.80	1.22	0.07	0	0	0	1	5	0.65	0.95
	Untimed oral reading fluency	1	6.23	11.11	0.78	0	0	0	10	38	4.64	7.83
		2	17.86	14.09	1.02	0	0	21	32	38	15.76	19.95
Untimed reading comprehension	1	0.20	0.63	0.04	0	0	0	0	4	0.13	0.27	
	2	0.72	1.02	0.06	0	0	0	1	4	0.59	0.84	
Kiswahili	Letter fluency	1	12.78	10.78	0.80	0	4	12	19	62	11.13	14.43
		2	17.37	11.68	0.66	0	8	16	24	94	16.01	18.73
	Nonword fluency	1	3.14	6.79	0.37	0	0	0	3	42	2.39	3.89
		2	10.98	10.95	0.65	0	0	9	20	50	9.65	12.31
	Oral reading fluency	1	3.75	8.39	0.46	0	0	0	2	56	2.79	4.70
		2	15.67	15.36	1.09	0	0	13	29	56	13.44	17.89
	Reading comprehension	1	0.27	0.70	0.03	0	0	0	0	5	0.20	0.34
		2	1.15	1.25	0.08	0	0	1	2	5	0.99	1.31
	Untimed oral reading fluency	1	6.29	12.31	0.69	0	0	0	5	41	4.89	7.70
		2	20.53	16.27	1.17	0	0	28	36	41	18.14	22.92
Untimed reading comprehension	1	0.28	0.61	0.03	0	0	0	0	4	0.21	0.34	
	2	0.91	0.92	0.06	0	0	1	2	4	0.78	1.03	
Listening comprehension	1	1.43	1.28	0.10	0	0	1	2	5	1.24	1.63	
	2	2.26	1.34	0.09	0	1	2	3	5	2.07	2.45	
Mathematics	Number identification	1	9.18	5.46	0.44	0	4	10	14	20	8.29	10.08
		2	13.84	3.79	0.25	0	13	15	15	20	13.33	14.36
	Quantity discrimination	1	2.80	2.36	0.12	0	1	3	4	10	2.56	3.04
		2	5.00	2.38	0.14	0	3	5	6	10	4.72	5.28
	Missing number	1	1.65	1.12	0.06	0	1	2	2	10	1.52	1.77
		2	2.78	1.38	0.06	0	2	3	4	10	2.65	2.91
	Word problems	1	0.68	0.94	0.05	0	0	0	1	4	0.58	0.77
		2	1.24	1.11	0.06	0	0	1	2	5	1.12	1.36
	Addition fluency (level 1)	1	3.11	3.48	0.24	0	0	2	5	17	2.61	3.60
		2	6.88	3.97	0.18	0	4	7	10	20	6.52	7.24
	Addition fluency (level 2)	1	0.32	0.82	0.05	0	0	0	0	5	0.21	0.43
		2	0.81	1.18	0.06	0	0	0	1	5	0.69	0.92
Subtraction fluency (level 1)	1	1.36	2.52	0.12	0	0	0	2	15	1.12	1.61	
	2	4.07	3.52	0.18	0	0	4	7	17	3.70	4.44	
Subtraction fluency (level 2)	1	0.18	0.68	0.04	0	0	0	0	5	0.10	0.27	
	2	0.42	0.91	0.06	0	0	0	0	5	0.30	0.53	

CI = Confidence interval

Q1 = 25th percentile

Q3 = 75th percentile

1. Introduction

Since independence in 1963, the Government of Kenya has recognized the importance of education, both as a basic human right as well as a tool for achieving socioeconomic development. In the past decade especially, Kenya performed remarkably well in increasing primary school gross enrolment. Between 2003 and 2007, for example, the total number of primary schools increased by 33.5%, from 19,554 to 26,104 (Ministry of Education [MOE], 2008). The number of children enrolled in primary schools rose from 5.9 million in 2002 to 9.4 million, according to the 2009 census. The number of children enrolled in Early Childhood Development and Education (ECDE) centres in 2009 was approximately 2.3 million (Kenya National Bureau of Statistics [KNBS], 2009). The current primary school population is estimated at 10.4 million children in both public and private primary schools.

The rapid growth in primary school population is largely attributed to the introduction of Free Primary Education (FPE) by the Government of Kenya in 2002. The overall policy goal of the government is to achieve universal primary education by 2015 in tandem with Kenya's Educational for All (EFA) and the Millennium Development Goal (MDG) commitments. The MDG on education requires signatories to put in place the necessary mechanisms and resources to ensure that all school-age children have access to a full course of primary education by 2015. Therefore FPE has given a large cohort of children access to education, many of whom would otherwise have missed out on learning due to lack of resources to pay school fees.

The MOE has also been concerned with the issues of equity and quality as the number of children joining the education system has increased. For example, the Kenya Education Sector Support Programme (KESSP I) was developed and implemented between 2005 and 2010. Under this programme, the government funded infrastructural development in schools, trained teachers through in-servicing, and started the National Assessment Systems for Monitoring Learner Achievement (NASMLA), among other things. There was a proposal to follow KESSP I with a similar programme (KESSP II) to comprehensively address the issue of quality in education, but this seems to have been overtaken by events given the recent reforms in the education sector.

In January 2011, the Government of Kenya appointed a task force to review the education system in Kenya and suggest ways of aligning it to both the Kenya Constitution and Vision 2030. Among other things, the task force was to propose strategies of addressing policy, content, and governance issues. The task force was also mandated to strategize on how to solve key challenges related to access, quality, equity, relevance, wastage, and efficiency in the education sector, among other things. The task force presented its findings at a national conference held in March 2012. Based on the work of the task force on education reforms, a policy framework has been drafted and will be presented to Parliament. The draft policy puts particular emphasis on teaching reading in the early years of schooling as a key strategy of addressing quality of education. The draft policy has also been informed by findings from earlier commissions and task forces (Ominde, 1964; Republic of Kenya, 1976, 1988, 1999).

A draft Education Bill has also been developed in anticipation of the major education reforms soon expected in Kenya. In line with the Kenya Constitution, the draft Education Bill describes

the expected changes in the management of the Education Sector, including the appointment of a Cabinet Secretary, a National Education Board, and County Education Boards. The draft Education Bill has also put on the agenda the challenges facing education in Kenya, particularly equity, quality, relevance, and efficiency in the management of educational resources. There is no doubt that the education system in Kenya is set to change soon; the issue of addressing quality education seems to be the critical factor that will drive the process.

The MOE's keenness in addressing the issue of quality in education is reflected in its support and involvement in a number of initiatives aimed at assessing learning outcomes in lower primary using tools and materials that have been successfully applied elsewhere in the region. In June 2007, the Early Grade Reading Assessment (EGRA) was piloted and followed up with an intervention in Malindi with the objective of improving reading outcomes in lower primary. The programme was funded by USAID/Washington and USAID/Kenya. In June 2009, USAID funded the piloting of the Early Grade Mathematics Assessment (EGMA), while in 2009 and 2010, the William & Flora Hewlett Foundation funded the assessment of learning outcomes using EGRA in four languages (Gikuyu, Dholuo, Kiswahili, and English), with particular emphasis on the language of instruction (LOI) used in classrooms.

Lessons learned from the 2007 Malindi intervention indicated that pupils' reading outcomes could be improved with the right mix of interventions, including development of lesson plans, professional development of teachers, and use of carefully designed reading materials. More critically, developing children's capacities in reading and numeracy through effective interventions can enable an entire generation to become economically independent and positive contributors to society. Investing in reading and numeracy among young pupils is perhaps the single most promising action to end extreme poverty in Kenya in line with the goals of Vision 2030.

Despite the strides made in improving access, equity, and quality of education in Kenya, there have been challenges. Kenya is a relatively young country with a population of 38.6 million people and an annual population growth rate of 2.8%. Approximately 43% of the population is under 14 years of age (KNBS, 2009). This implies that the large numbers of children who have taken advantage of FPE have stressed the existing facilities considerably. In addition, the increase in primary school enrolment required a corresponding increase in the number of trained teachers employed by the Teachers' Service Commission. However, current statistics indicate that approximately 40,000 additional teachers are needed in order to achieve the acceptable pupil-teacher ratio of 1:40 at the primary school level. There are also gross disparities within regions, the worst affected being Arid and Semi-Arid Lands (ASAL) and areas affected by insecurity. Similarly, schools in the densely populated areas—such as urban areas, informal settlements, and some rural parts of Central, Nyanza, Western, and Rift Valley—tend to have large classes. Unavailability of recommended textbooks, teaching aids, and other learning materials; limited classroom space; and poor management of schools have compounded the problem. Predictably, the quality of education has been negatively affected (Uwezo, 2010).

Existing data show that pupils in lower classes have low levels of reading and numeracy skills. In the study conducted in Malindi in 2007, Class 2 pupils were able to identify an average of

only 4.7 and 22.7 letters per minute in Kiswahili and English respectively. When asked to read a short story, the pupils could only read 10.2 and 11.4 words per minute (wpm) in Kiswahili and English respectively (Piper, 2010). In a study conducted in 2009 in four languages in Central Kenya and Luo Nyanza, the average oral reading fluency was 30.4 wpm in English, 21.2 wpm in Kiswahili, 20.0 wpm in Gikuyu, and 19.6 wpm in Dholuo. Numeracy levels are similarly low. In Malindi in 2009, Class 1 children could identify only 27.5% of the numbers they were shown and could fill in the missing number only 5.3% of the time. Fifty per cent of the children in Classes 1–3 answered less than 50% of the word problems correctly, with Class 1 pupils answering only 25.8% of the word problems correctly.

Kenya is not alone in currently attaining low results in basic skills in literacy and numeracy. Research conducted elsewhere in sub-Saharan Africa tells the same dismal story. For example, in a baseline study conducted in Liberia, Class 2 pupils could read an average of only 14.5 wpm. In South Africa, pupils could read only 3.9 wpm at the end of Class 1. Although studies indicate low reading and numeracy skills among children, lessons learned from interventions have shown that learning outcomes among children in lower primary can be improved considerably with limited investments. For example, after only seven months of intervention, children in experimental schools in Malindi increased their scores in Kiswahili letter recognition (335%); word recognition (96%); oral reading fluency (100%); and reading comprehension (106%).

1.1 Objectives of the Baseline Study

The ability to read and understand simple text is the most basic skill that children need in lower primary, especially in Classes 1 and 2. Low literacy levels among primary school children affect their performance in other subjects, including mathematics, science, and social studies. Children who cannot read are also more likely to drop out of school before they complete primary school because of frustration, discouragement, and stigmatization by their peers and teachers. Similarly, children need a firm foundation in basic mathematical skills in order to function in an increasingly competitive and technologically based world. In particular, Kenyan children need numeracy skills to access a basic economic understanding and contribute to the realization of Vision 2030.

Borne out of the concern to improve the quality of reading and numeracy in early grades in Kenya, the MOE, USAID and RTI International are collaborating in the implementation of the PRIMR Initiative. The PRIMR Initiative focuses on improving numeracy and reading outcomes in Classes 1 and 2 in the intervention schools using a data-driven strategy. It is posited that the PRIMR approach will provide the fundamental skills in reading that are necessary for improving oral reading fluency and comprehension. The initiative will also increase mathematics skills that are critical for improved number sense, computational fluency, and problem solving. In order to assess the impact of PRIMR on pupil outcomes, PRIMR's research design has scheduled baseline, midterm, and endline assessments in January 2012, October 2012, and October 2013, respectively. This report presents the findings of the January 2012 baseline assessment.

The key objectives of the baseline study were to:

1. Establish the baseline reading fluency in English and Kiswahili of pupils in Classes 1 and 2 in the intervention and control schools.
2. Establish the reading comprehension levels in English and Kiswahili of pupils in Classes 1 and 2 in the intervention and control schools.
3. Establish the numeracy and computational skills of pupils in Classes 1 and 2 in the intervention and control schools.
4. Establish the existing pedagogical methods, including language-of-instruction usage, in reading and mathematics in Classes 1 and 2 in the intervention and control schools.
5. Assess the availability of teaching and learning materials in reading and mathematics in Classes 1 and 2 in the intervention and control schools.
6. Administer the Snapshot of School Management Effectiveness (SSME) instrument in intervention and control schools.

The PRIMR baseline study produced a large amount of data that have been summarized and presented in this report. The baseline results provide scientific evidence on the challenges that pupils in lower primary school in the sampled areas and schools are facing in reading and numeracy. The results therefore provide a basis for designing and scaling up effective policies, strategies, and practices that help improve pedagogy in Kenyan schools. The goal is to ultimately improve the reading and numeracy skills of pupils in lower primary levels in Kenya.

1.2 Significance of the Baseline Study

The results also have critical implications for the successful implementation of the PRIMR Initiative, the MOE reform agenda, and the Kenya education sector in general. The PRIMR Initiative is both an intervention and a randomized experimental research design. The use of an experimental design will help determine the most effective techniques of delivering instruction in lower primary intervention schools. However, the focus is on children in Classes 1 and 2, because it is at this time in their life cycle that children start developing reading and numeracy skills. The experimental research design comprises the baseline, which will be compared to both the midterm and endline results to determine the incremental changes in reading and numeracy.

At the national level, the results presented in this report will inform the proposed changes to the education sector in Kenya. The outcome of this research should also build the capacity of MOE in designing education programmes in reading and mathematics and in assessing the learning outcomes among pupils in early primary levels. Any scale-up efforts will definitely benefit from the different findings discussed in this report. In particular, the MOE should be able to use the results discussed in this study to solicit assistance and support from bilateral partners, multilateral partners, nongovernmental organizations (NGOs), and all other stakeholders in education.

2. Research Design and Methodology

As noted above, as an intervention and a research initiative, the PRIMR Initiative will be assessed at baseline, at midterm, and at the end of the intervention period. During the first year of the project (2012), a given number of government and nonformal schools will be part of the first active cohort participating in the PRIMR activities. The nonformal schools will have two strands: Some of the nonformal schools will be assigned in groups of 15:1 to coaches, while others will be assigned in groups of 10:1 to an individual coach. This will help PRIMR determine the impact of coach/teacher ratio on outcomes and cost. During the second year of PRIMR (2013), an additional number of public schools and nonformal schools will begin their participation in project activities. Half of the nonformal schools joining the initiative in 2013 will have a school/coach ratio of 10:1 and the other half will have a school/coach ratio of 15:1. PRIMR will also have an information and communication technology (ICT) component during the second year that will be implemented in approximately 60 schools, most likely in Kisumu. Finally, a longitudinal study involving approximately 1,000 Class 1 pupils will be conducted with the aim of following 1,000 children from baseline, to midterm, to endline.

2.1 Regional Selection for the Baseline

A critical factor in selecting the areas that would be covered in the baseline study was the MOE's policy on the language of instruction for lower primary. Schools in rural settings are, by policy, to use mother tongue or the language of the catchment area as the language of instruction for Classes 1 and 2. Schools in urban and peri-urban areas are required to use Kiswahili as the language of instruction for lower primary because of the ethnic mix of children in these settings.

The areas selected for the baseline were therefore urban or peri-urban areas where Kiswahili was most likely to be used as the language of instruction. In addition, the PRIMR Initiative includes reading in Kiswahili as one of the intervention areas; hence the need to select regions where Kiswahili would likely be used more frequently compared to mother tongue of the catchment area.

The various locations where PRIMR would be implemented and the baseline conducted were discussed by the MOE and USAID prior to PRIMR start-up. The panel agreed to three urban areas, two of which would include schools in peri-urban and rural areas. The urban centres selected were Nairobi City, Thika Municipality, and Nakuru Municipality (see map, Figure 1). Thika and Nakuru would include schools in the peri-urban and rural areas, as described below.

Figure 1. Map of Kenya



Source: CIA Factbook

2.2 Adaptation of EGRA and EGMA Tools

The use of the EGRA and EGMA tools to assess reading and mathematics outcomes in Kenya started as early as 2007 in Malindi, followed by the Central Kenya and Nyanza studies in 2009 (Piper, 2010). For the purposes of the PRIMR baseline study, an adaptation workshop was held in October 2011 with the MOE and officers from Semi-Autonomous Government Agencies (SAGAs). Those who attended the workshop included officers from the KIE, KNEC, and Directorates of Education (Quality Assurance, Basic Education, Standards, Policy and Planning). Other organizations represented included the University of Nairobi, SIL International, and teachers. The purpose of the adaptation workshop was to localize and validate the EGRA and EGMA tools as well as to ensure ownership of the study findings by the MOE and other stakeholders in education in Kenya.

The participants used the Class 1 and 2 KIE syllabi in Kiswahili, English, and mathematics to prepare the tools and match them to local realities. The group also ensured that the tools were well calibrated to avoid ceiling and floor effects (i.e., tests that are too difficult or too easy for pupils, so that results are clustered at the top or bottom of the distribution), when Classes 1 and 2 were tested using the same tools. Before the end of the adaptation workshop, participants conducted a mini-pilot of the tools among Class 1 and 2 pupils in several nonformal schools and one public school in Kibera, Nairobi. The participants shared their experiences in the field and suggested changes to the tools as well as more effective procedures for administering the tools, given the likely variations in environment across different types of schools and geographical regions.

2.3 Baseline EGRA and EGMA Subtasks

These EGRA tools assess a set of skills critical to early reading acquisition. The following subtasks were assessed in the baseline in both Kiswahili and English:

1. *Letter-sound fluency*: ability to say the sound of each letter fluently. At the baseline, pupils were presented with 100 commonly occurring letters based on the textbooks that are used in Classes 1 and 2 in Kenya. The subtask was assessed in English and scored as the number of “letter sounds” said correctly per minute.
2. *Letter-naming fluency*: ability to naturally read the most commonly occurring letters of the alphabet. This subtask was assessed in Kiswahili and scored as the number of letters read correctly per minute.
3. *Nonword oral reading fluency*: ability to process words that could exist in a given language but do not. These are made-up words and hence unfamiliar to the pupils. The objective of using nonwords was to assess the child’s ability to decode words fluently and efficiently. This subtask was measured by counting the words read per minute. In the baseline, it was measured in both Kiswahili and English.
4. *Connected-text oral reading fluency*: ability to read a simple story. The story was presented in a user-friendly way to the pupil and in easy-to-read letters. It was measured in words read correctly per minute and assessed in both Kiswahili and English. At the baseline, two stories were used: one was 60 words long and timed at 1 minute and the other was 40

words long and timed at 3 minutes. The shorter passage was the equivalent of an untimed passage for 97% of the sample.

5. *Reading comprehension in connected text:* ability to answer several comprehension questions based on the passage the pupil reads himself or herself. It was measured as “percentage correct” out of five questions and assessed in both English and Kiswahili. Measures also evaluated the comprehension score out of the number of questions attempted.
6. *Listening comprehension in connected text:* ability to answer several comprehension questions based on a passage read to the pupil by the assessor. It was measured as “percentage correct” out of five questions and was assessed only in Kiswahili.

The EGMA tools below assess a set of skills critical to numeracy and computational skills in Classes 1 and 2. The following seven subtasks were assessed in the baseline using either Kiswahili or English, depending on which of the two languages the pupil was most comfortable with:

1. *Rational counting:* ability to count objects systematically. The pupil was presented with 100 circles and requested to count from left to right. The subtask was scored as the total number of circles correctly counted per minute.
2. *Number identification:* ability to identify a number and give its name in English or Kiswahili. This was scored as percentage of numbers correctly identified per minute out of 20.
3. *Quantity discrimination:* ability to determine the larger number between a pair of numbers. The objective was to test the pupils’ number fluency, number sense, and place value. This was scored as a percentage out of the total attempted.
4. *Missing number:* ability to identify missing numbers from a group of 3. This was scored as a percentage out of 10 problems.
5. *Addition:* ability to add simple sums fluently, at different levels of complexity. The pupil was given 20 sums to solve and the subtask was scored as the number solved correctly per minute. A second level of addition, comprising five items, was included in the tool. The pupil was provided with paper, counters, and a pencil to solve the problems, which included “carrying over.” These items had a higher level of difficulty compared to items in level 1. This section was not timed and the pupil was not asked to do it if he or she had not answered any of the level 1 items correctly.
6. *Subtraction:* ability to subtract simple differences fluently, at different levels of complexity. The pupil was given 20 sums to solve and the items scored as the number solved correctly. A second level of subtraction, comprising five items, was included in the tool. The pupil was provided with paper, counters, and a pencil to solve the problems, which included “borrowing.” These items had a higher level of difficulty compared to items in level 1. This section was not timed and the pupil was not asked to do it if he or she had not answered any of the level 1 items correctly.

7. *Word problems*: ability to solve basic word problems. The problems were read to the pupil in English or Kiswahili and the pupil was requested to provide the answer. The subtask was scored as a percentage of the word problems solved correctly.

2.4 Piloting of Baseline Tools

The EGRA and EGMA tools were revised based on comments received during the adaptation workshop and the field testing that followed the workshop in a few schools in Kibera, Nairobi. The revised tools were piloted among approximately 90 Class 1 and 2 children in different schools in Nairobi during 8–10 November 2011. Five different forms of EGRA (Kiswahili and English) and three different forms of EGMA were piloted. In Kiswahili, pupils read five different stories in each form. This allowed the team to select the most appropriate stories to use in the baseline. Six assessors who had previously collected data in nonformal schools using EGRA tools were trained for one day on the use of the tools and the stopwatches. They collected the pilot data in three schools under the supervision of experienced RTI staff.

The pilot data were entered into an Excel-based data entry system developed by RTI. The data were then cleaned and analysed to determine which items and forms were appropriate for use. The various subtasks in each form were revised and reworded; some of the stories in Kiswahili and English were dropped; and the forms generally were checked for consistency, fluency, and time taken to administer the tool. It was estimated that Kiswahili would take about 14 minutes to administer, English about 15 minutes, and mathematics approximately 18 minutes. This was reduced when the children were less skilled and as the assessors became more accustomed to the tools. Finally, three forms of EGRA (English), three forms of EGRA (Kiswahili), and three forms of EGMA were deemed equivalent based on the results of the pilot data. One set was therefore selected for use in the baseline and the other two will be used at midterm and endline, after further equating procedures are done. Final checks on the baseline EGRA and EGMA tools were made and changes in formatting completed to improve each of the instruments before the training of the assessors that commenced on 3 January 2012.

2.5 Sampling

As stated above, the PRIMR Initiative is targeting 500 schools located in Nairobi, Thika, and Nakuru urban and peri-urban areas. The schools selected in Nairobi include both public schools and nonformal schools located in predominantly informal settlements. The sampling framework was therefore developed separately for public schools (Nairobi, Thika, and Nakuru) and nonformal schools (Nairobi only).

2.5.1 Public Schools

It was first necessary to randomly select zones that would participate in the PRIMR Initiative based on the regions that were agreed upon between the MOE and USAID/RTI International. The selected zones were then randomly assigned to treatment and control groups. The treatment groups were in two cohorts; Cohort 1 comprises schools that are receiving the PRIMR intervention in 2012, while Cohort 2 comprises schools that will receive the PRIMR intervention in 2013. Cohort 3 is the control group, which for ethical reasons will also receive some

intervention at the beginning of 2014, but after the endline study is conducted. In Nairobi, the City Education Office provided RTI with a list of public schools located in 15 zones in the city. Five zones were randomly selected for inclusion in the PRIMR Initiative. In Thika, 9 zones were identified and 3 zones selected at random, while in Nakuru, 3 zones out of a total of 9 zones were selected at random. Table 1 shows the zones selected for inclusion in the PRIMR Initiative by region and cohort and the total number of schools these zones. It was ensured that the selected zones had active and committed Teacher Advisory Centre (TAC) tutors and District Education Officers who were willing to participate in the initiative.

Following the random selection and assignment of zones, and hence schools within those zones, to cohorts, the sampling of pupils to be assessed at the school level was straightforward. Approximately half of all the schools in each sampled zone were randomly selected to participate in the baseline regardless of the cohort they were in. In each sampled school, 10 Class 1 and 10 Class 2 pupils were sampled using a systematic random sampling technique. It was ensured that half of the pupils selected in each class for assessment were girls and the other half were boys. Table 1 also shows the number of schools that were randomly sampled for the baseline by zone, region and cohort. The final baseline therefore assessed pupils in 95 public schools.

Table 1. Sampled zones and schools for PRIMR and sampled schools for baseline

Phase	Region (PRIMR)	Selected zone (PRIMR)	Total number of schools in the selected zone	Number of schools sampled for the baseline
1	Nairobi	Nairobi West	8	4
		Dandora	18	9
	Nakuru	Eastern	15	8
		Mauche	14	10
	Thika	Ithanga	11	6
2	Nairobi	Juja Rd	17	9
		Riruta	12	6
	Nakuru	Central	11	6
		Kambi ya Moto	17	8
	Thika	Madaraka	8	4

Phase	Region (PRIMR)	Selected zone (PRIMR)	Total number of schools in the selected zone	Number of schools sampled for the baseline
3	Nairobi	Viwanda	13	7
	Nakuru	Lare	19	9
	Thika	Thika West	19	9
Totals			182	95

2.5.2 Nonformal Schools

A three-stage sampling process was also used to sample the nonformal schools in Nairobi. Given that there were no reliable lists of the hundreds of nonformal schools in Nairobi, the PRIMR team created the sampling frame itself. Nonformal schools are usually located in the informal settlements in urban centres. Nairobi happens to have the largest concentration of nonformal schools in the country because of the large unplanned settlements in the city. Unlike private schools in middle- and high-income areas of Nairobi, some nonformal schools are unable to meet the registration standards required by the MOE. For example, most of these schools cannot provide proof of land ownership because they are located in informal settlements. They are also not able to meet the required standards in terms of infrastructural development and staff qualifications. But again, the number of children of school-going age in these settlements is very large and therefore the nonformal schools are filling a glaring gap in the provision of primary education in the country. For this reason, the nonformal schools are allowed to operate after registering with the Ministry of Gender, Children, and Social Development (MGCSD) or the City Education Office. The MOE, City Education Office, NGOs, faith-based organizations, and civil society organizations (CSOs) have been supporting some of the nonformal schools with learning materials, food, and training courses for teachers.

Because there was no comprehensive and accurate listing of existing nonformal schools in Nairobi, RTI carried out an enumeration exercise of nonformal schools in informal settlements and low-income areas of the city. The enumeration exercise was conducted in November 2011 by 18 trained assessors. A checklist was developed and used to filter schools so that only nonformal schools offering the KIE curriculum in a normal school setting were captured. The type of information collected on these schools during the enumeration exercise included: the actual physical location of the school, registration status, correct name(s) of the school, enrolment in Classes 1 and 2, number of years in existence, management structure, number of teachers and their training levels, etc.

As noted, to be included in the sampling frame, the school had to be registered with the relevant ministry or other recognized authority (e.g., MOE, MGCSD, City Education Office). The enrolment in Classes 1 and 2 was required to be reasonably high so that 20 pupils could be assessed in each school (10 in Class 1 and 10 in Class 2). Preferably, the school should have

been an examination centre for the Kenya Certificate of Primary education (KCPE). The school was also required to have a working management structure, including a parents' association or committee; and should have been in existence for more than 5 years. Experience has shown that new schools in unplanned settlements tend to have limited lifespans because pupils transfer to other more stable schools as they move to upper primary. Finally, the selected schools had to be within reasonable distance from other similar schools within a given geographical unit that would form a cluster.

Initially, approximately 1,000 schools were identified during the enumeration exercise. The initial list was cleaned and some schools dropped because they did not meet the inclusion criteria. To avoid duplication of effort and overlap with other similar USAID-funded projects, nonformal schools in Mukuru and Mathare areas, and schools in Starehe, Makandara, and Kamukunji Divisions/Districts, were omitted from the sampling frame although they met the criteria. The final sampling frame had approximately 700 schools.

In all, 230 nonformal schools were selected and grouped into geographic clusters. The selected clusters were then randomly assigned to treatment groups and the control group. This process produced a total of 11 clusters of 10 schools each and 8 clusters of 15 schools each. In each cluster, a random sample of schools was selected for the baseline regardless of the treatment group or the phase (year 1 or year 2). For the purposes of the baseline, we selected one half of the schools in each cluster at random. In total, 125 nonformal schools were assessed in the baseline across 6 of the 8 divisions of Nairobi, as shown in Table 2.

Table 2. Sampled clusters and schools for PRIMR and sampled schools for baseline

Cohort	Division/District	Selected cluster	Total number of schools in the selected cluster	Number of schools sampled for the baseline
1	Langata	Gatwekera	10	5
	Embakasi	Matopeni	10	5
	Westlands	Gichagi	10	5
	Kasarani	Kariobangi North	15	7
	Dagoretti	Congo	15	8
2	Kasarani	Korogocho	10	5
	Embakasi	Babadogo	10	5
	Langata	Riruta	10	5
	Langata	Kianda	10	5
	Embakasi	Soweto	10	5

Cohort	Division/District	Selected cluster	Total number of schools in the selected cluster	Number of schools sampled for the baseline
	Kasarani	Zimmerman	10	5
	Embakasi	Kayole	15	7
	Langata	Makina	15	8
	Embakasi	Posta	15	7
	Embakasi	Chokaa	15	8
3	Embakasi	Kariobangi	10	5
	Dagoretti	Ngando	10	5
	Langata	Silanga	15	7
	Westlands	Waruku	15	8
	Starehe	Huruma	10	10
Totals			225	125

The total number of schools sampled for the baseline was 220, comprising 95 public schools and 125 nonformal schools. In each sampled school, 20 pupils were randomly selected for assessment (10 in class 1 and 10 in class 2). At the class level, systematic random sampling was used, where all the children in each class (including all streams) were requested to line up and every n^{th} pupil was picked to achieve the required number. Systematic random sampling was done separately for girls and boys to achieve gender parity.

2.5.3 Characteristics of Assessed Pupils

It was only in very few schools that a ratio of 1:1 was not achieved between girls and boys and between Class 1 and Class 2, as shown in Table 3 and Table 4. The final number of pupils assessed using EGRA and EGMA tools was 4,385, as shown in Table 3. In addition, information was obtained from the head teacher and two teachers (Classes 1 and 2) in each sampled school.

Table 3. Pupils assessed by class and sex

Class	Girls	Boys	Totals
1	1,085	1,107	2,192
2	1,101	1,092	2,193
Totals	2,186	2,199	4,385

Table 4. Sampled schools and pupils by class

County	Schools	Class 1	Class 2	
Nairobi	39	390	390	
Thika	19	190	190	
Nakuru	41	410	410	
Nonformal	121	1202	1203	
Totals	220	2192	2193	4385

As shown in Table 5, the ages of the assessed pupils ranged between 3 years and 14 years in Class 1 and between 5 years and 16 years in Class 2. The modes were 6 years and 7 years for Class 1 and Class 2 respectively. These data imply that the majority of the children are entering primary school at the recommended age of between 6 and 7 years. Although a number of children were over 8 years old, most of these had been affected by factors such as displacement due to insecurity, parental negligence, orphanhood, poverty, and other social factors.

Table 5. Ages of assessed pupils, by class

Age	Class 1	Class 2
3	2	0
4	4	0
5	362	9
6	914	275
7	641	893
8	154	630
9	64	214
10	38	125
11	5	23
12	2	15
13	0	5
14	1	2
15	0	1
16	0	1

Approximately 72% of the assessed pupils attended school all day. The policy requires pupils in these classes to attend school half a day, but the majority of the schools allowed the children to continue until 3 or 4 pm. Children who stay in school all day oftentimes do not have anybody to take care of them at home, as most parents are at work. In the more rural settings, the children also have to wait for their friends or older siblings in the upper primary to take them home when they finish classes at 4.30 pm.

2.6 Data Collection

In accordance with legal and ethical requirements in Kenya, approval to collect data from pupils in the sampled schools was sought from the National Council of Science and Technology (NCST). The approval was granted and a certificate issued on 5 December 2011. Ethical review of the research was also done by the RTI Institutional Review Board (IRB) as well as the Kenya Medical Research Institute (KMRI). Both bodies also reviewed the research protocol, including the instruments, data collection procedures, mechanisms put in place to ensure privacy and confidentiality of data, and process of obtaining consent from parents or guardians.

RTI has a corps of experienced assessors in Kenya who have been engaged in collecting assessment data in schools using EGRA and EGMA tools since 2007. These assessors were contacted in December 2011 and requested to attend a one-week training during the first week of January 2012. Sixty-eight assessors were trained during 3–8 January 2012. During the training, the assessors were drilled in assessing EGRA (Kiswahili and English) subtasks and EMGA subtasks using stopwatches. Observer reliability tests were done for both EGRA and EGMA. The scores for the Kiswahili observer reliability ranged between 93.0% and 97.2% with a mean of 95.3%. For English, the scores ranged between 93.9% and 96.1% with a mean of 96.1%. The mean for EGMA was 96.0%. The assessors were therefore highly reliable.

The assessors were grouped into 17 teams of four people each. The most experienced assessor in each team was appointed as the supervisor of the team. The supervisors were given further training in classroom observation using video, and they also worked with trainers who had experience in administering the SSME tool across several countries. The objective was to equip the supervisors with skills in observing teachers' instructional leadership and pedagogical quality using the SSME tool. The SSME tool is an observation checklist that collects information on the languages used by the teacher during instruction (Kiswahili or English) and the teacher's interaction with pupils (e.g., is the teacher speaking to the entire class, a group, or a single pupil? Are pupils left to work on their own or in groups?). These data are supplemented with information collected through interviews with head teachers and classroom teachers, as well as inventories of classroom and school quality. Therefore supervisors were also trained on how to conduct interviews with the head teacher and Class 1 and 2 teachers.

The supervisors were carefully taken through the fieldwork manual that had been prepared by RTI. The manual explained how the supervisors were to validate data at the field level and ensure that consistency in procedures and adherence to ethical principles were maintained. The supervisors were also required to work closely with the RTI staff, who were coordinating the baseline (two in Nairobi, one in Thika, and one in Nakuru). Data were collected during 9–27

January 2012 in the three regions. Two teams were deployed in Thika, three teams in Nakuru, and 10 teams in Nairobi. Completed tools were checked by supervisors for correctness and placed in manila envelopes. The EGRA and EGMA forms were placed in different envelopes for each school. Completed head teachers' interview forms, teachers' interview forms, teachers' observation forms, and the classroom inventory and sampling sheets were all placed in a different envelope. The envelopes were then placed in plastic bags for each school and the name of the school, the date of the assessment, and the team and the supervisor's name were written on top. The supervisors returned the bags with the completed tools to the coordinators at the end of each day. Also at the end of each day, the coordinators and supervisors discussed emerging issues and challenges that needed to be addressed.

Each pupil was assessed in Kiswahili, English, and mathematics. The assessment order was randomized to avoid "fatigue effect." This is discussed in more detail in Section 6.3.4. The assessors were thoroughly conversant with all the assessment tools and alternated among Kiswahili, English, and mathematics each assessment day to minimize systematic errors in a specific tool. At the end of the baseline data collection exercise, 4,385 pupils were assessed; 219 head teachers interviewed; 410 Class 1 and 2 teachers interviewed; 208 English lessons observed; 205 maths lessons observed; and 205 classroom inventories conducted.

The results—including frequencies and percentages—should be interpreted as representative of the children sampled in the three regions (Thika, Nakuru, and Nairobi). The estimation of means and levels of statistical significance were calculated using the survey command in the statistical software Stata to establish the parameters for each level of selection. The data needed to be weighted to increase statistical power so that the number of pupils assessed, however small, would represent the estimated population at each level of sampling. For example, the data represents pupils grouped into schools, schools within zones/clusters, and zones/clusters within regions (Nakuru, Thika, and Nairobi). Based on the estimated total population in the final sample, a weight was calculated for each level of selection (zone/cluster, school) and each observation (pupil). The weighting requires that, instead of reporting the standard deviation, the standard error is reported. While the standard deviation indicates average difference from the sample mean, the standard error estimates the difference from the population parameter. It is therefore a better measure of the accuracy of the computed sample means.

2.7 Reliability Estimates

A reliability analysis was conducted to determine the appropriateness of the subtasks in assessing Class 1 and 2 pupils in Kenya. Pearson correlation coefficients were computed among the subtasks in each tool, as discussed the sections that follow. Ideally, strong correlations among the subtasks are preferred because they indicate consistency in the performance of the sampled pupils across the subtasks.

2.7.1 English Tool Analysis

Table 6 presents pairwise correlations for the subtasks in the English tool. All the correlations were statistically significant ($p < 0.05$). However, it is interesting to note that the correlations between letter sound fluency and each of the other subtasks are relatively low. This seems to

suggest that the sampled pupils had difficulties with letter sound fluency, but despite their limited ability in this subtask, some could still read some words and answer some comprehension questions. This is contrary to what would be expected of this cohort of pupils because letter sound fluency is considered critical to the other outcomes, especially oral reading fluency and reading comprehension. This likely stems from the methods that Kenyan children utilize to read English, focusing primarily at the word level rather than the letter and sound level. Also of interest are the strong correlations among the other subtasks (nonwords, timed and untimed oral reading fluencies, and reading comprehension). These strong correlations indicate that those children who could read with some level of fluency answered some questions correctly and the weak readers answered hardly any comprehension questions correctly. Indeed, the correlations can be inflated by a large proportion of nonreaders (whether nonwords or a passages) scoring particularly low on the reading comprehension, with only a few fluent readers answering a good number of comprehension questions correctly. This is perhaps a more likely scenario with this sample of pupils.

Table 6. Pearson correlations for subtasks in English

	Letter-sound fluency	Nonwords	Oral reading	Reading comprehension	Untimed oral reading	Untimed oral reading comprehension
Letter-sound fluency	1.00					
Nonwords	0.47**	1.00				
Oral reading	0.37**	0.88**	1.00			
Reading comprehension	0.29**	0.65**	0.77**	1.00		
Untimed oral reading	0.41**	0.85**	0.90**	0.67**	1.00	
Untimed oral reading comprehension	0.30**	0.63**	0.73**	0.75**	0.69**	1.00

** $p < 0.01$.

The internal consistency of items within each subtask in the English tool was assessed using Cronbach's alpha, as shown in Table 7. All five reading subtasks had alpha values of 0.88 or higher, indicating high agreement among the items within each subtask, based on the performance of pupils in the sample.

Table 7. Cronbach's alpha for the English tool subtasks

Subtask	Item-test correlation	Item-rest correlation	Alpha
Letter sound fluency	0.56	0.43	0.90
Nonwords	0.92	0.90	0.88
Oral reading	0.92	0.89	0.88
Reading comprehension	0.71	0.70	0.90
Untimed oral reading	0.92	0.89	0.88
Untimed oral reading comprehension	0.68	0.68	0.90

2.7.2 Kiswahili Tool Analysis

Pairwise correlations for the Kiswahili subtasks are presented in Table 8. The correlations are all statistically significant ($p < 0.05$). Both the letter-naming fluency and the listening comprehension subtask have low correlations with other subtasks (nonwords, timed and untimed oral reading, and comprehensions). A similar scenario was noted in the English and indicates that the sampled pupils had difficulties with letter naming fluency but could still read some words and answer some comprehension questions in Kiswahili. Similarly, the sampled pupils seem to have answered some listening comprehension questions correctly but did poorly in oral reading and reading comprehension. This suggests that pupils understand and can respond to Kiswahili questions well even with poor reading ability.

Strong correlations emerged among the other subtasks (nonwords, timed and untimed oral reading fluencies, and reading comprehension). As in English, children who could read with some level of fluency in Kiswahili answered some questions correctly, and the weak readers answered hardly any comprehension questions correctly. Once again, the large proportion of nonreaders who could answer hardly any of the oral reading comprehension questions may have inflated the results for this sample of pupils.

Table 8. Pearson correlations for subtasks in Kiswahili

	Letter-naming fluency	Nonwords	Oral reading	Reading comprehension	Untimed oral reading	Untimed oral reading comprehension	Listening comprehension
Letter-naming fluency	1.00						
Nonwords	0.44**	1.00					
Oral reading	0.44**	0.91**	1.00				
Reading comprehension	0.42**	0.80**	0.88**	1.00			
Untimed oral reading	0.44**	0.86**	0.89**	0.80**	1.00		
Untimed oral reading comprehension	0.41**	0.70**	0.75**	0.73**	0.80**	1.00	
Listening comprehension	0.33**	0.37**	0.41**	0.44**	0.41**	0.45**	1.00

** $p < 0.01$

Table 9 shows the internal consistency of the items in each subtask of the Kiswahili tool as measured by Cronbach's alpha. The alpha values are between 0.80 and 0.90, indicating very high consistency of the items within each subtask in assessing the sampled pupils.

Table 9. Cronbach's alpha for the Kiswahili tool subtasks

Subtasks	Item-test correlation	Item-rest correlation	Alpha
Letter-naming fluency	0.62	0.55	0.89
Nonwords	0.88	0.86	0.88
Oral reading	0.91	0.88	0.88
Reading comprehension	0.82	0.82	0.90
Untimed oral reading	0.90	0.87	0.88
Untimed oral reading comprehension	0.76	0.76	0.90
Listening comprehension	0.46	0.45	0.90

2.7.3 Mathematics Tool Analysis

As stated earlier, the EGMA tool had seven subtasks: counting, number identification, number discrimination, missing number, addition levels 1 and 2, subtraction levels 1 and 2, and word problems. The pairwise correlations among all the subtasks are statistically significant ($p > 0.05$), as shown in Table 10. The pupils seem to have scored much higher in rational counting compared to the other subtasks. This subtask is therefore an outlier and is poorly correlated with all other subtasks in the tool. It indicates that the majority of the pupils assessed could count to a reasonable degree regardless of their level of performance on the other subtasks. Counting was not therefore a good predictor of their computational skills. It was probably based on memory in this sample of pupils. In short, it is likely that children learn to count prior to coming to Class 1, and this counting subtask is not measuring the types of skills that Class 1 pupils would acquire sequentially. Word problems and subtraction level 2 subtasks have low correlations with the other subtasks (except level 2 addition). It indicates that most pupils in this sample found these two subtasks particularly difficult and they may have scored somewhat higher on the other subtasks.

Table 10. Pearson correlation for subtasks in mathematics

	Rational counting	Number identification	Quantity discrimination	Missing number	Addition level 1	Addition level 2	Subtraction level 1	Subtraction level 2	Word problems
Rational counting	1.00								
Number identification	0.48*	1.00							
Quantity discrimination	0.39**	0.67**	1.00						
Missing number	0.37**	0.58**	0.58**	1.00					
Addition level 1	0.41**	0.55*	0.55**	0.54**	1.00				
Addition level 2	0.25**	0.28**	0.33**	0.36**	0.52**	1.00			
Subtraction level 1	0.35**	0.46**	0.51**	0.51**	0.71**	0.44**	1.00		
Subtraction level 2	0.15**	0.16**	0.19**	0.25**	0.29**	0.57*	0.35**	1.00	
Word problems	0.26**	0.31**	0.37**	0.37**	0.40**	0.27**	0.40**	0.19**	1.00

** $p < 0.01$

The number identification subtask was reasonably correlated with quantity discrimination, missing number, and addition level 1 subtasks. This subtask does not therefore seem to have influenced higher-level outcomes such as addition level 2, subtraction, and word problems for

this sample of pupils. Quantity discrimination was reasonably correlated with missing number and addition level 1 and subtraction level 1. Again, pupils' skills in this subtask do not seem to have determined performance on higher-order outcomes among the assessed pupils. Scores in the missing number subtask are only reasonably correlated with level 1 addition and subtraction. Skills in this subtask are considered critical in predicting other advanced outcomes in mathematics but this is not borne out by the results.

Addition level 1 is strongly correlated with level 1 subtraction and reasonably correlated with level 2 addition, as would be expected. However, it is poorly correlated with level 2 subtraction scores. The correlation between level 2 addition scores and level 2 subtraction scores is relatively strong, implying that pupils who could subtract at an advanced level could also add at the same level of difficulty, as expected. These results seem to suggest that subtraction skills predict addition skills, but many pupils found the subtraction subtask difficult.

The Cronbach's alpha coefficients for the items within the maths subtasks are all above 0.89, as shown in Table 11. It should be noted that rational counting is omitted because it cannot reasonably and sensibly be itemized for this level of pupils. The Cronbach's alpha coefficients are extremely high and indicate consistency among the items in the subtasks in discriminating among the sampled pupils with regard to their numeracy and computational skills.

Table 11. Cronbach's alpha for the mathematics tool subtasks

Subtasks	Item-test correlation	Item-rest correlation	Alpha
Number identification	0.66	0.63	0.89
Quantity discrimination	0.59	0.57	0.90
Missing number	0.59	0.58	0.90
Addition level 1	0.53	0.50	0.90
Addition level 2	0.30	0.29	0.89
Subtraction level 1	0.49	0.46	0.90
Subtraction level 2	0.49	0.46	0.90
Word problems	0.31	0.30	0.90

Generally, the reliability results of the EGRA and EGMA tools presented in this section show that the tools were highly reliable, especially for the sample of pupils assessed. The internal consistencies are particularly impressive, as there was high agreement of items within each subtask across all three assessment tools.

3. Early Grade Reading Assessment (EGRA) Results

The educational system in Kenya is highly examination-oriented and pupils are often drilled to pass examinations such as the KCPE. The KCPE, for example, is mainly used for selection into secondary school and hence, tends to be overwhelmingly norm-referenced in form and intent. A norm-referenced test compares the performance of an individual pupil with the rest of the pupils, regardless of the actual level or quality of learning that may have been achieved by each pupil. In contrast, EGRA and EGMA are criterion-based type of assessments. A criterion-referenced test is designed to compare an individual's performance to specific criteria or mastery level of the subject matter or task. With EGRA, pupils are assessed on their ability to read and comprehend class-appropriate stories.

This section presents EGRA results for English and Kiswahili by subtask. The subtasks assessed in both languages were letter sound fluency, nonword fluency, timed and untimed oral reading fluency, and timed and untimed reading comprehension. Pupils were also assessed in listening comprehension in Kiswahili. Summary statistics for all the subtasks for the whole sample are shown in Table 12 (English) and Table 13 (Kiswahili).

Table 12. English subtask results for all pupils

Subtask	Mean	Std. dev.	Std. error	Min.	10 th percentile	50 th percentile	90 th percentile	Max.
Letter sounds (pm)	19.23	18.37	1.36	0	0	18	46	91.00
Nonwords (pm)	10.98	13.15	0.77	0	0	8	31	81.70
Oral reading fluency (pm)	13.97	21.06	1.13	0	10	4	49.8	141.60
Untimed oral reading (pm)	14.39	22.88	1.10	0	0	3.7	52.5	154.30
Reading comprehension (%)	0.50	1.03	0.05	0	0	0	2	5
Untimed reading comprehension (%)	0.47	0.90	0.04	0	0	0	2	4

Overall, the assessed pupils scored higher in English compared to Kiswahili except for the comprehension subtasks, as shown in Table 12 and Table 13. The means for English letter sound fluency and Kiswahili letter name fluency were 19.23 and 15.19 letters per minute respectively ($F = 23.1, p = 0.00$). For nonwords, the means were 10.98 wpm for English and 7.27 wpm for Kiswahili ($F = 107.8, p = 0.00$). In reading fluency, the sampled pupils scored a mean of 13.97 wpm in English and a mean of 10.11 wpm in Kiswahili ($F = 53.5, p = 0.00$). For the untimed reading fluency, the respective means for English and Kiswahili were 14.39 and 9.83 wpm ($F = 51.8, p = 0.00$).

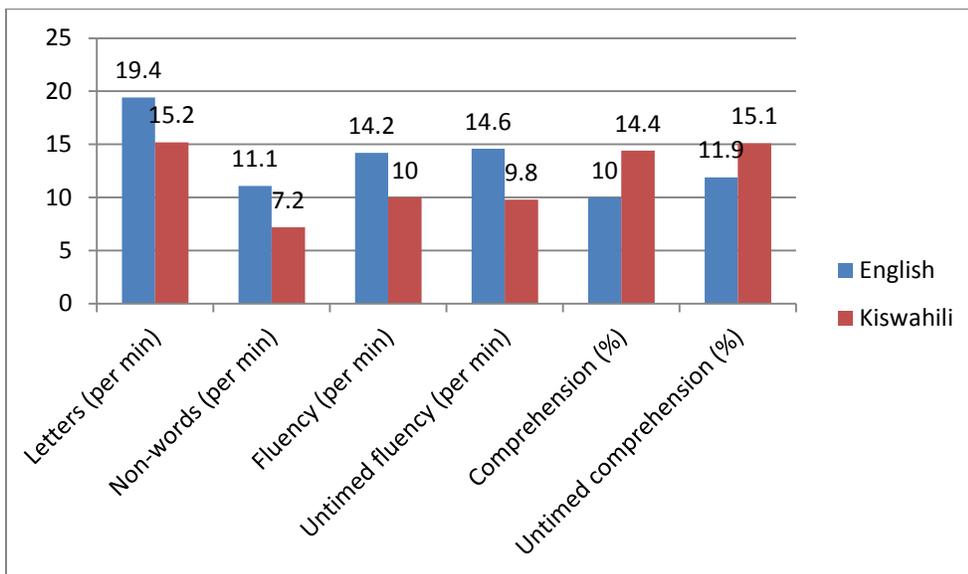
In the comprehension sections, the assessed pupils scored higher in Kiswahili compared to English. The overall means for reading comprehension were 0.50 in English and 0.74 in Kiswahili ($F = 52.46, p = 0.00$). For the untimed section, the overall mean for reading comprehension in English was 0.47 compared to 0.61 for Kiswahili ($F = 27.9, p = 0.00$).

Table 13. Kiswahili subtask results for all pupils

Subtask	Mean	Std. dev.	Std. error	Min.	10 th percentile	50 th percentile	90 th percentile	Max.
Letter sounds (pm)	15.19	11.52	0.70	0	1	16	31	94
Nonwords (pm)	7.27	10.15	0.49	0	0	0	23	62.67
Oral reading fluency (pm)	10.11	14.41	0.77	0	0	0	35	120
Untimed oral reading (pm)	9.83	14.99	0.71	0	0	0	33	162.86
Reading comprehension (%)	0.74		2.36	0	0	0	35	1
Untimed reading comprehension (%)	0.61	0.86	0.04	0	0	0	0.63	4

The overall results indicate that pupils were generally able to read better in English compared to Kiswahili, but they comprehended less of what they read in English. This is depicted in Figure 2. For example, compared to English, the pupils' Kiswahili comprehension scores were approximately 44% higher in the timed passages and 27% higher in the untimed Kiswahili passages.

Figure 2. Performance of pupils by subtasks and language



3.1 English and Kiswahili Letter Fluency

In this section and those that follow, we present the reading assessment outcomes for both Kiswahili and English, focusing on particular skills across languages. First, we discuss letter fluency. In English, pupils were assessed in letter-sound fluency or the ability to say the sound of each letter fluently. In Kiswahili, pupils were assessed in letter-naming fluency or the ability to naturally read the most commonly occurring letters of the alphabet. Pupils seem to have had difficulties with letter sounds in both languages (Table 14), but as earlier stated, they performed significantly better in English compared to Kiswahili. This is contrary to what would be expected if classes were following the language-of-instruction policy, because Class 1 and 2 pupils in urban and peri-urban settings would be expected to be taught in Kiswahili except during English lessons.

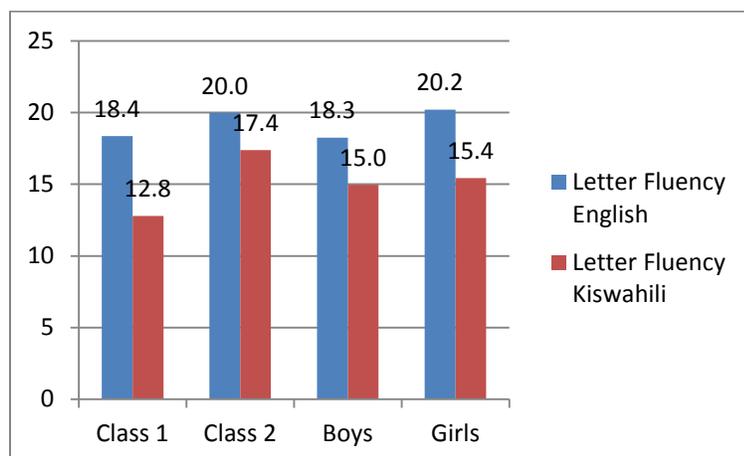
Table 14. Kiswahili and English letter fluency

Disaggregation levels	English		Kiswahili	
	Means	Standard error	Mean	Standard error
Class 1	18.4	17.9	12.8	10.8
Class 2	20.0	18.6	17.4	11.7
Boys	18.3	17.3	15.0	11.3
Girls	20.2	19.4	15.4	11.8

It is surprising that, in English, Class 2 pupils scored an average of only 1.6 letters per minute higher than Class 1 pupils, as Table 14 indicates. This suggests that pupils in Class 2 gained little during the previous year when they were in Class 1. Secondly, it shows that pupils in Class 1 must have learned English letter sounds at least somewhat when they were in preschool or pre-unit compared to their counterparts in Class 2. In Kiswahili, Class 2 pupils read almost 5 letters per minute more than Class 1 pupils, which shows a modest learning effect in Class 1. The policy regarding teaching of Kiswahili in preschool is not clear and teachers at that level seem to focus on English sounds rather than Kiswahili letters.

As shown in Figure 3, girls outperformed boys by about 2 letters per minute in English ($t = 3.3$, $p = 0.00$) but there was no statistically significant difference in Kiswahili letter fluency between boys and girls. These results contrast with other studies in Kenya that have found significant differences in letter fluency between boys and girls, with girls significantly outperforming boys (Piper, 2010). In urban Kenya, then, as opposed to the locations studied previously, there were no gender differences in letter fluency.

Figure 3. Letter fluency, by class and sex



3.2 Nonword Oral Fluency in English and Kiswahili

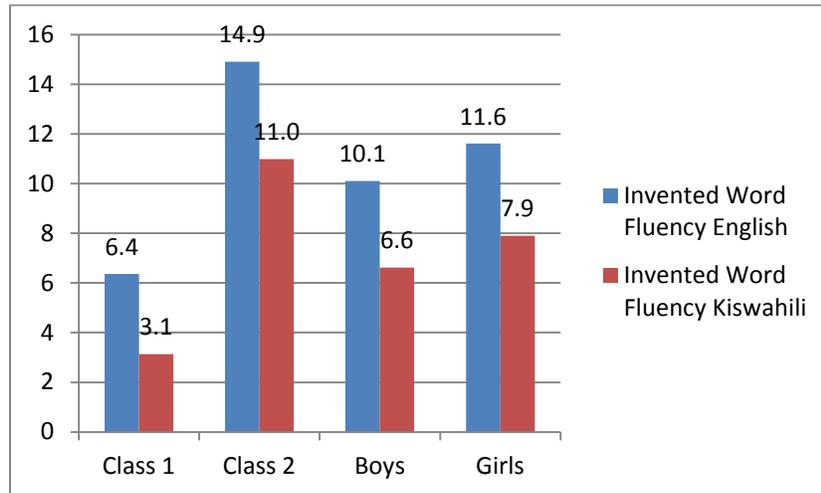
All sampled pupils were tested on their ability to read nonwords in English and Kiswahili. This tests the ability of the pupil to decode text and to utilize the common structures of reading unfamiliar words, and is predictive of future reading success. In addition, the use of nonwords minimizes the chances of pupils reading familiar words they have memorized instead of using decoding skills to read words. This subtask was measured by counting the number of words read correctly in one minute. The overall results showed that pupils performed significantly better in English (11.0 wpm) compared to Kiswahili (7.3 wpm) and this difference was statistically significant, as mentioned above (see Table 14).

Figure 4 shows the nonword fluency summary results disaggregated by class and sex. The difference in nonword fluency between Class 1 and 2 pupils in both languages is worth noting. Class 2 pupils read more than Class 1 pupils on average by 8.5 and 7.9 wpm in English and Kiswahili respectively. Children appear to have been learning decoding skills in Class 1, given this difference, while they did not appear to be learning to read letters in the discussion above. Interestingly, Class 1 pupils were able to read twice as many words per minute in English compared to Kiswahili, suggesting that even as children enter Class 1, decoding English is slightly easier for them. Class 2 pupils read an average of 36% more words per minute in English than Kiswahili. While these results indicate heavy emphasis in reading in English compared to Kiswahili, especially for Class 1, there seems to have been little emphasis in teaching decoding skills in either language. The problem was compounded by the poor letter sound fluency skills among the pupils in both languages. It is also likely that there was some confusion between English letter sounds and Kiswahili letter names among a significant proportion of pupils as well as teachers at this level. Taking the nonword and letter fluency scores together, it appears that the pupils had very modest decoding skills.

Girls read slightly more nonwords in both English and Kiswahili, contrary to other studies that have found significant differences between girls and boys on this subtask. In English, girls read

approximately 1.5 wpm more compared to boys ($t = 2.8, p = 0.00$) and in Kiswahili, they read 1.3 wpm higher ($t = 2.9, p = 0.00$), as illustrated in Figure 4. Given that the direction of the relationship is the same as earlier studies, we hypothesize that the lack of variation in the outcome was the reason for the lack of gender difference on this subtask.

Figure 4. Nonword fluency, by class and sex



3.3 Oral Reading Fluency

In oral reading fluency using connected text, pupils were asked to read two passages in English and two passages in Kiswahili. The first passage in each language was timed at 60 seconds and was approximately 60 words long, but the second passage was timed at 3 minutes and was only 40 words long. The reason for providing the children with two passages in each language was to determine whether their fluency levels differed by the length of time provided and the length of the passage they were asked to read in the two languages.

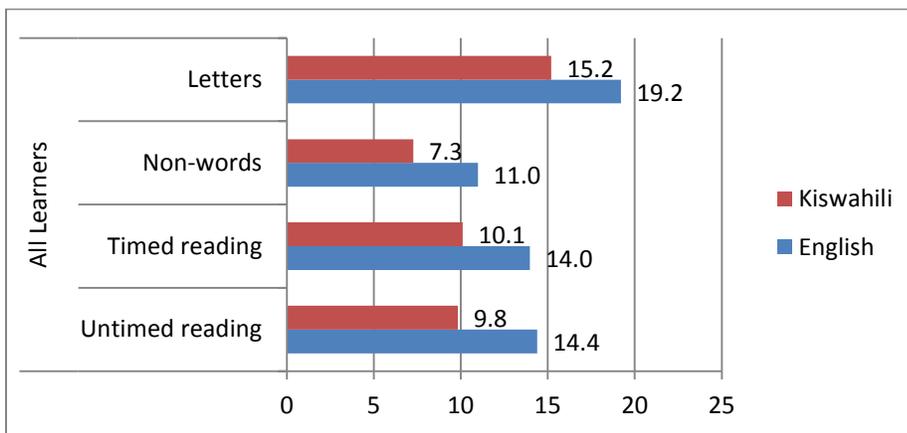
3.3.1 Reading Fluency in English and Kiswahili

The tendency of pupils to do better in English than in Kiswahili in common reading subtasks has previously been illustrated in Central, Nyanza, and Nairobi provinces (Piper, 2010). The baseline results showed similar trends. The overall mean reading fluency in the timed English passage was 14.0 wpm in compared to 10.4 wpm in Kiswahili ($F = 53.4, p = 0.00$). In the untimed passages, the overall means were 14.4 and 9.8 wpm in English and Kiswahili, respectively ($F = 51.8, p = 0.00$). Note that although no statistically significant differences emerged between the timed and untimed Kiswahili passages ($F = 1.5, p = 0.23$), pupils read the Kiswahili timed passage slightly more fluently than the untimed passage. In English, however, pupils read slightly more fluently in the untimed passage compared to the timed passage.

The poor performance of the pupils on all the reading subtasks in both English and Kiswahili reflect poor decoding skills, as illustrated in Figure 5. This figure shows the general comparison between fluency of various types. The standard comparison is that children are more fluent in

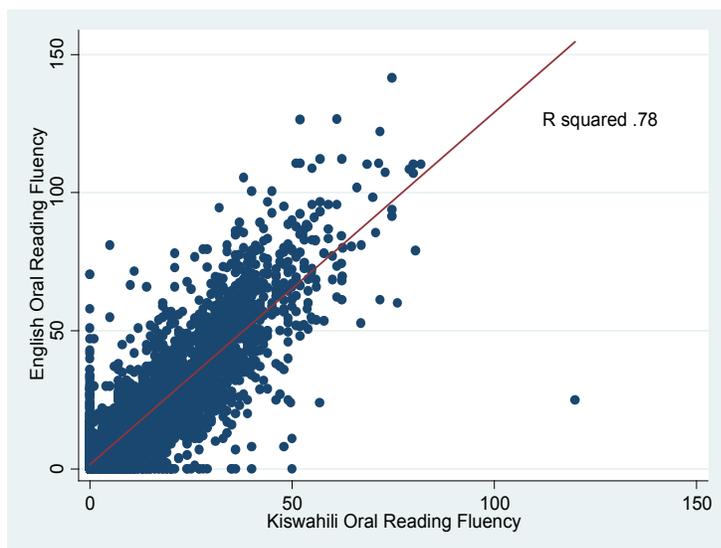
letters, less fluent in nonwords, and less fluent in reading. In Kenya, however, a consistent finding (Piper, 2010) is that children are even less fluent in nonwords than they are in oral reading fluency using connected text. This appears to be because the strategy that pupils take to read words does not use decoding, which limits the efficiency of their reading. It is also worth noting that there was no significant difference in the performance of pupils in both the timed and untimed reading passages. Nor did the length of the passages seem to make any difference for fluency. The implication of these findings is that giving pupils more time to read or varying the length of the passage does not make any difference in their performance on fluency, if pupils do not have the necessary reading skills such as decoding. It is important to emphasize that for the average pupil, on all of these subtasks in both languages, the pupils were able to read somewhere between 1 letter every 3 seconds to one word every 6 seconds. These are remarkably low fluency rates for the relative middle-class and upper-class socioeconomic statuses in the areas of interest.

Figure 5. Comparison of reading fluency in reading subtasks



We were interested in the relationship between fluency rates in English and Kiswahili, given the literature (Piper, 2010; Piper & Miksic, 2011; Piper, Trudell & Schroeder, 2012) on the relationships between fluency rates for the same pupil assessed across different languages. Overall, the PRIMR baseline results indicated a significant relationship between the ability to read in Kiswahili and English, as shown in Figure 6. Pupils who could read Kiswahili passages fluently were also able to read English. This is indicated by the R^2 of .78, meaning that knowing how fluently a pupil read in Kiswahili predicts 78% of the variation in English fluency. This finding is unique in Kenya, given the multilingual environments across the country (Piper, 2010), as well as in the specific locations that PRIMR works. The ideal situation would be to have pupils' scores concentrated at the upper end of the line of best fit, as in Figure 6. This requires considerable effort and focus and is therefore one of the key expected outcomes of PRIMR, to ensure that all children can read in both languages.

Figure 6. Relationship between oral reading fluency in Kiswahili and English



3.3.2 Reading Fluency in English and Kiswahili by Sex and Class

Table 15 shows summary results for the timed reading fluency in English and Kiswahili, disaggregated by Class and sex. It shows that children could read much better in Class 2 than in Class 1, with the class difference at 14.6 words per minute for English and 11.9 words per minute for Kiswahili in Class 2. This class-level difference is quite similar to what has been found in other countries that have at least modest reading skills. The gap in fluency levels between English and Kiswahili was lower in Class 1 (1.4 wpm) than in Class 2 (4.1 wpm). For the overall sample, girls performed better than boys in both English and Kiswahili. In English, girls read 1.8 wpm more than boys; and in Kiswahili, they read 1.6 wpm more than the boys. Other studies have found similar results (Piper, 2010) in other parts of Kenya. The lack of statistically significant differences in fluency rates for letters and nonwords discussed above might be because of a lack of variation in the fluency rates themselves.

Table 15. Timed reading fluency in Kiswahili and English, by class and sex

Disaggregation levels	English		Kiswahili	
	Mean	Std. dev.	Mean	Std. dev.
Class 1	5.2	11.4	3.8	8.4
Class 2	19.8	19.7	15.7	15.4
Boys	12.0	17.1	9.2	13.4
Girls	13.8	18.8	10.8	14.7

In the untimed reading passages, both boys and girls performed better in English than in Kiswahili, as shown in Table 16. The difference between boys and girls for the untimed passage

was almost the same as the difference observed in the timed passages. The girls were reading 2.5 wpm and 1.8 wpm better than boys in English and Kiswahili respectively.

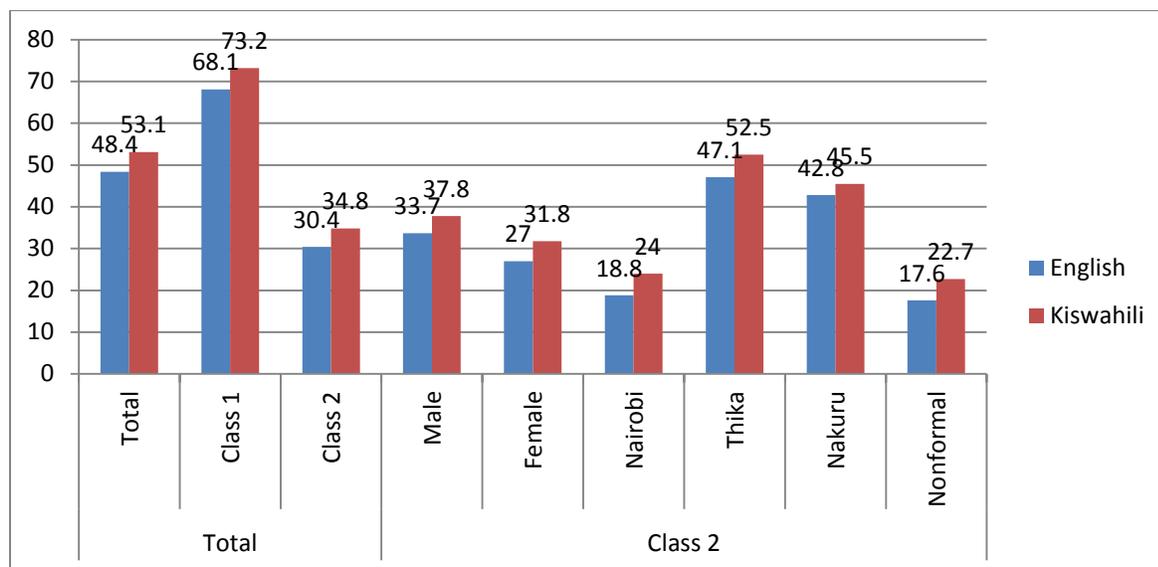
Table 16. Untimed reading fluency in Kiswahili and English, by class and sex

Disaggregation levels	English		Kiswahili	
	Mean	Std. error	Mean	Std. error
Class 1	5.4	0.8	3.7	0.4
Class 2	22.4	1.5	15.4	1.0
Boys	13.1	1.1	8.9	0.7
Girls	15.6	1.3	10.7	0.8

As expected, Class 2 pupils performed significantly higher in both English and Kiswahili ($p = 0.00$) compared to Class 1, as shown in Table 16. The difference in English reading fluency and Kiswahili reading fluency among Class 1 pupils was less than the difference between English and Kiswahili fluency among Class 2 pupils.

A large proportion of pupils in the overall sample could not read any word in the timed English (48.4%) and Kiswahili (53.1%) passages. As shown in Figure 7, the proportions of pupils in Class 1 and Class 2 who could not read any words in English were 68.1% and 30.4% respectively. In the timed Kiswahili passage, 73.2% of Class 1 pupils and 34.8% of Class 2 pupils could not read a single word.

Figure 7. English nonreaders, by sex, class, and region



Thika and Nakuru also had large proportions of Class 2 pupils who were nonreaders. The percentages were 47.1 for Thika and 42.8 for Nakuru in the timed English passage. In the timed Kiswahili passage, 52.5% of pupils in Thika and 45.5% of pupils in Nakuru could not read. Results further indicate that there were more nonreaders in the control group (English 35.0% and Kiswahili 46.4%) compared to the treatment groups (English 28.9% and Kiswahili 38.7%). This implies that the treatment groups were starting at a slightly higher level of fluency compared to the control group; future comparisons must take this difference into account in computing the actual change due to the intervention.

Results further indicate that there were more Class 2 nonreaders among males in both English (33.7%) and Kiswahili (37.8%) compared to girls (English – 27.0% and Kiswahili – 31.8%). These are dismal results because they imply about 1 in 3 pupils transit to Class 2 without learning how to read anything in English or Kiswahili. As nonreaders move to upper levels in primary school, their chances of learning to read diminish.

3.3.3 Reading Fluency in English and Kiswahili by Cohort and Region

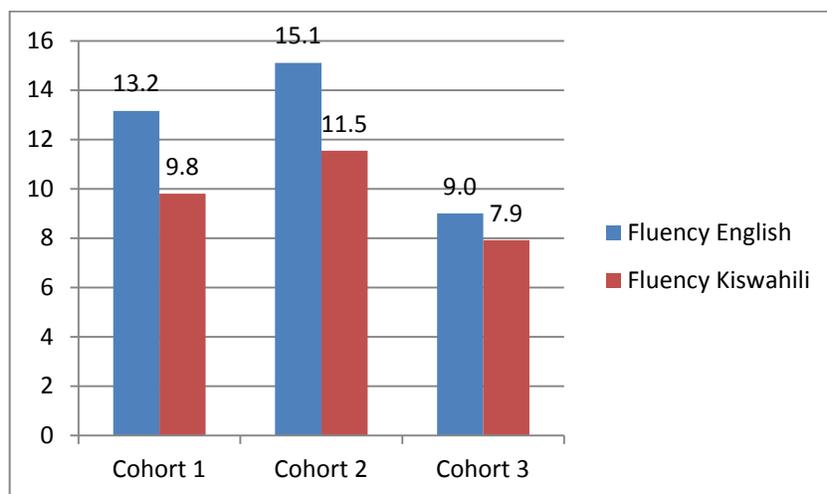
The comparison between the control and treatment groups on reading fluency is of particular interest because of the design of the PRIMR Initiative. One key assumption was that the control and treatment groups would be similar at the start of the initiative so that differences noted at both the midterm and endline assessments could be attributed to the treatment. This was assumed as the clusters and zones were randomly assigned to treatment groups. It also was assumed that the variability, as measured by the standard deviation, within the cohorts would not be significantly different. (This is the homogeneity-of-variance assumption.) Table 17 shows the means and standard deviations for the three cohorts.

Table 17. Summary results, by cohort

Cohort	English		Kiswahili	
	Mean	Std. dev.	Mean	Std. dev.
1	13.2	17.1	9.8	13.1
2	15.1	19.5	11.5	15.1
3	9.0	16.0	8.0	13.3

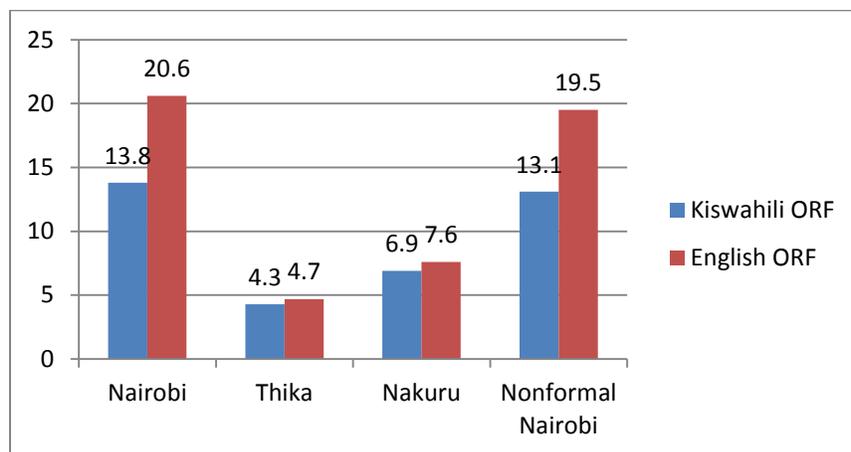
These results indicate that Cohort 2 had the highest reading fluency in English ($F = 8.1, p = 0.00$) and Kiswahili ($F = 3.9, p = 0.00$) compared to Cohorts 1 and 3, as shown in Figure 8. Cohort 2 consists of schools that will receive the PRIMR interventions in 2013. Cohort 3, the control group, had the lowest reading fluency in both English and Kiswahili and will not receive PRIMR interventions until after the endline assessment, in late 2013. These results should be taken into account during analysis and interpretation of future comparisons after the midterm and endline assessments. The standard deviations for Cohorts 1, 2, and 3 did not differ significantly.

Figure 8. Reading fluency in English and Kiswahili, by cohort



Recall that pupils were sampled from three geographical regions (Nairobi, Thika, and Nairobi). In Nairobi, the sampled schools included both public schools and nonformal schools in informal settlements. This strategy allowed a comparison between these two categories of schools and the locations. The results for the different groups of schools are presented in Figure 9.

Figure 9. Timed English and Kiswahili reading fluency, by region



On the timed English passage, Nairobi scored higher than both Thika and Nakuru ($F = 118.5, p = 0.00$). On the timed Kiswahili passage, Nairobi scored higher than Thika and Nakuru, and Nakuru scored higher than Thika ($F = 82.9, p = 0.00$). The striking result is the low level of reading fluency on both the timed English and Kiswahili subtasks in Thika and Nakuru regions. In Thika, pupils could read only 4.3 wpm in Kiswahili and 4.7 wpm in English, while in Nakuru they were reading at 6.9 wpm and 7.6 wpm in Kiswahili and English respectively. In Nairobi, nonformal schools were reading at 19.5 wpm in English compared to the formal public schools'

20.6 wpm. In Kiswahili the reading fluency for nonformal schools was 13.1 wpm and 13.8 wpm for the public schools.

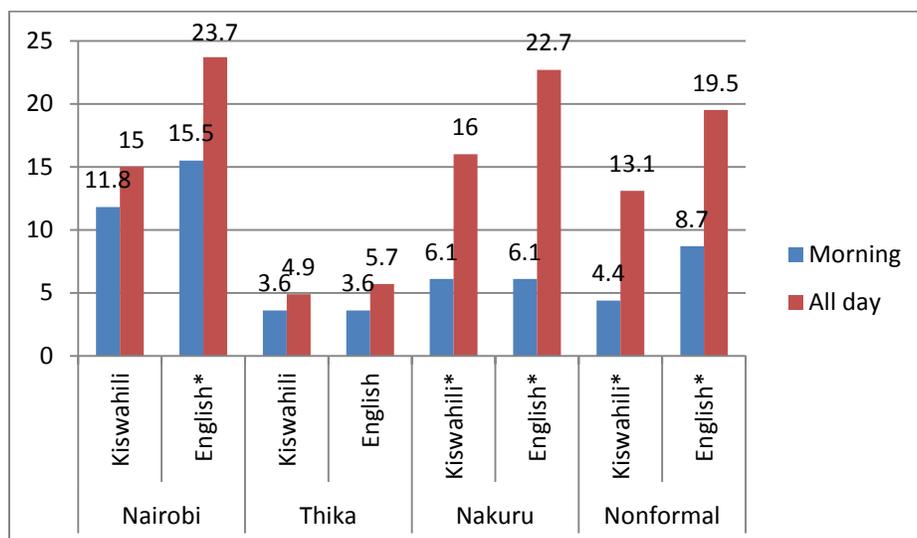
It is not very clear why pupils in Thika and Nakuru were considerably poorer in reading Kiswahili and English. Discussions with MOE officials and local education officers suggests that some schools in peri-urban areas of Kenya where Kiswahili should be the language of instruction for pupils in Class 1 and 2, tend to have a rural environment, but with a mix of ethnic groups. This implies that children are exposed to several languages and may be forced to use different languages at different times, but they do not appear to be gaining much proficiency in either of the languages we assessed. This definitely has an impact on learning and especially learning how to read proficiently in English and Kiswahili.

The comparison between reading fluency in public schools and nonformal schools in Nairobi is of interest. The nonformal schools tend to cater for economically disadvantaged families. These children therefore lack amenities such as proper classrooms, books, trained teachers, and even proper diet. If these children are reading at the same level—if not better than—children in public schools, other intervening factors must be at work in the home and at school. It has been suggested that children living in informal settlements in urban areas learn to cope better with the harsh realities of their environments at an early age. They therefore see education as their only hope of getting out of poverty. Some of these schools also get some help from NGOs and the communities are much more involved in the affairs of the schools. The baseline assessment was able to investigate some of the classroom characteristics of these schools, as it might be that instructional or supervisory factors contribute to the relative success of the children in nonformal schools. The results are reported in the sections that follow.

Differences in reading fluency were found between pupils who attended school the whole day and those who attended school only for a half day. It should be noted that the MOE's policy requires Classes 1 and 2 to attend school for only a half day. Figure 10 shows fluency levels for school shift type by region and language. Pupils who attended school the whole day consistently performed better than pupils who attended school half a day. The largest differences were noted in English, particularly in Nairobi (23.7 wpm), Nakuru (22.7 wpm), and nonformal schools (19.5 wpm). The respective English scores for pupils who attended school half a day in these areas were 15.5 (Nairobi), 6.1 (Nakuru), and 8.7 (nonformal).

In Kiswahili, school shift does not seem to have had a significant impact on fluency levels in various regions (Figure 10). School shift made a marginal difference in English and Kiswahili in Thika, although those who attended school all day still did better than those who attended school half a day. The gaps were largest in Nakuru and in the nonformal schools in Nairobi.

Figure 10. Oral reading fluency, by school shift



*Statistically significant

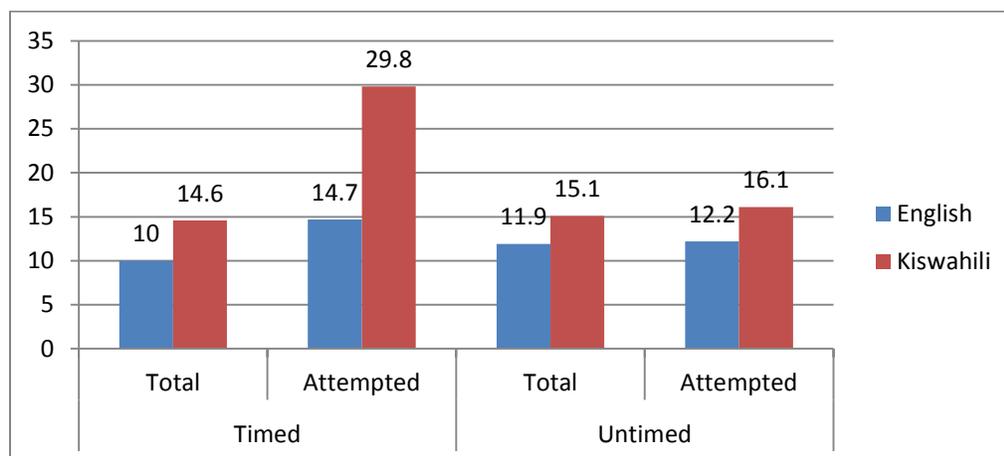
It is common practice for some schools to offer remedial classes in the afternoon for children who perform poorly in Classes 1 and 2. These results, however, indicate that schools that offer a half day are definitely different in systematic ways from those that offer a full day of schooling.

3.4 Reading Comprehension in English and Kiswahili

The essence of improving pupils' reading outcomes is to ensure that they have sufficient reading fluency to comprehend what they read, whether in Kiswahili, English, or any other Kenyan languages. Pupils were asked comprehension questions after they had read the timed and untimed passages in English and Kiswahili. In addition, there was a listening comprehension subtask in Kiswahili, where the assessor read a passage to the pupils and then asked them some questions. This subtask is important to measure the relationship between children's oral comprehension and their reading comprehension, and to assess their vocabulary skills independent of their reading skills.

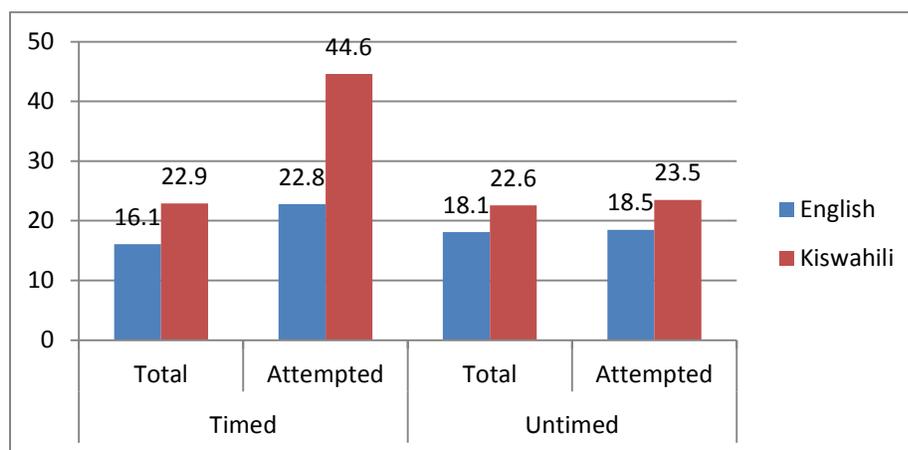
Figure 11 shows reading comprehension scores for all pupils, both as a percentage of the total number of questions in the test and as a percentage of the questions attempted by the pupils in English and Kiswahili. Results indicate that, for the whole sample, pupils performed consistently better in Kiswahili compared to English in both the timed and untimed passages. The largest difference was between pupils' scores on the timed Kiswahili (29.8%) and the timed English (14.7%) passages for the attempted questions only. This reiterates the fact that although pupils may have been reading less in Kiswahili than in English, as earlier noted, a higher percentage of them understood what they read in Kiswahili compared to English.

Figure 11. Comprehension scores, by total and attempted



Based on the questions attempted, Class 2 did far better on the timed Kiswahili passage (44.6%) as shown in Figure 12. Their comprehension scores on the untimed Kiswahili passage, based on both total and attempted number of questions, were similar at 22.6% and 23.5% respectively.

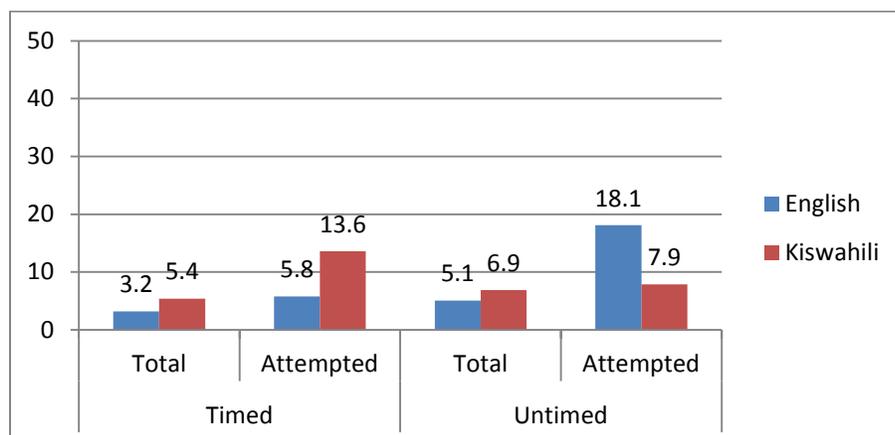
Figure 12. Class 2 comprehension scores, by total and attempted



In English, Class 2 pupils still did better on the timed passage based on the attempted number of questions (22.8%). This represented a 4.3% difference between the performance of children on the untimed reading comprehension subtask, based on both total and attempted number of questions.

In Class 1, pupils performed much higher on the timed Kiswahili comprehension (13.6%) based on the number of questions attempted, as shown in Figure 13. Their comprehension scores on the untimed Kiswahili passage, based on both total and attempted number of questions, were similar at 6.9% and 7.9% respectively. These scores are about half of what the pupils scored on the timed Kiswahili comprehension subtask; a similar scenario was noted in Class 2.

Figure 13. Class 1 comprehension scores, by total and attempted



Unlike Class 2 pupils, Class 1 pupils performed much higher on the untimed English comprehension subtask (18.1%) based on the attempted number of questions. Class 1 English comprehension scores on the timed section, based on both the total and the attempted number of questions, were not very different (3.2% for the total and 5.8% for the attempted).

Comparing Figure 12 and Figure 13, based on the attempted number of questions, Class 2 pupils scored consistently higher than Class 1 on the timed Kiswahili comprehension subtask (44.6% compared to 13.6%) and the English comprehension subtask (22.8% compared to 5.8%). On the untimed Kiswahili passages, Class 2 scored 23.5% as opposed to 7.9% for Class 1. On the untimed English comprehension subtask, Class 1 scored 18.1% while Class 2 scored 18.5%.

The striking result is the large proportion of pupils who did not answer any of the comprehension questions, in both Kiswahili and English. As Figure 14 shows, 76.5% of all pupils could not answer a single question in the timed English passage. The corresponding percentage for Kiswahili was 63.5. Class 1 also had a large proportion of pupils who scored zero on the timed English comprehension (90.8%) and the timed Kiswahili comprehension (83.9%). The Class 2 zero scores in English and Kiswahili were 63.6% and 45.0% respectively.

Figure 14. Proportion of pupils unable to answer one question (timed comprehension)

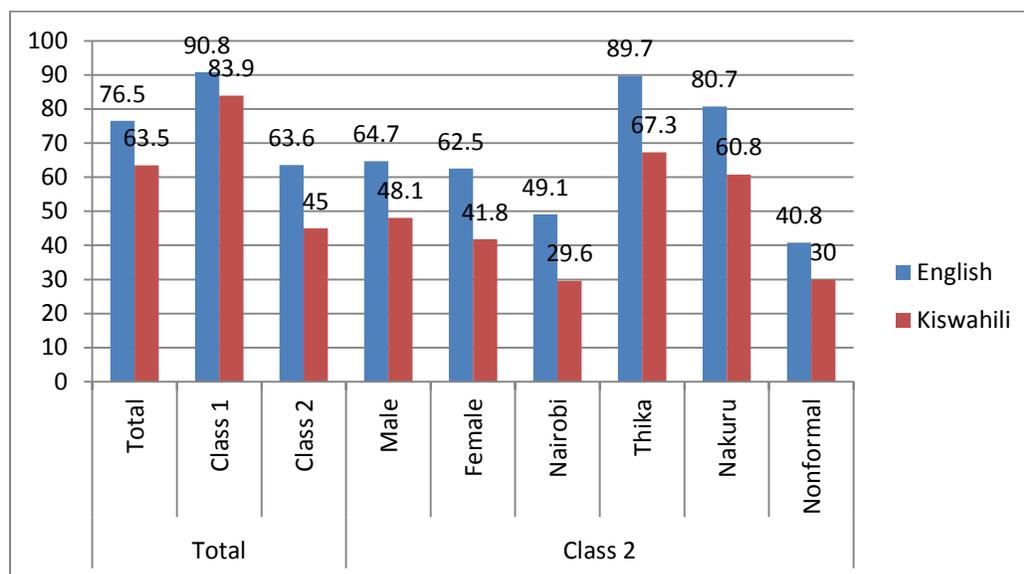
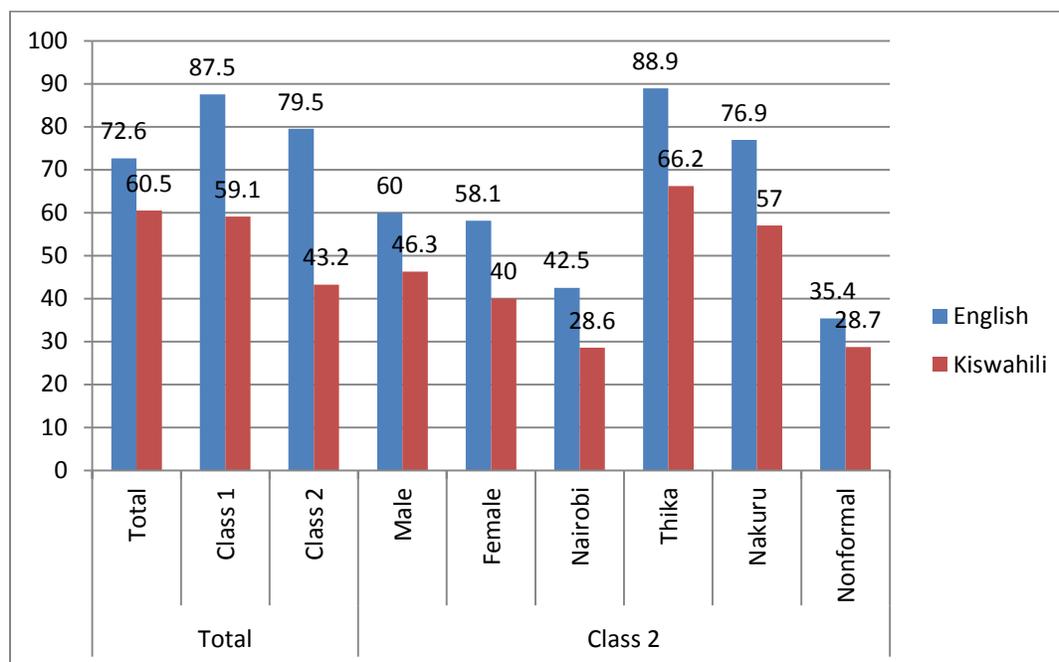


Figure 14 also presents percentages of Class 2 pupils who scored zero on the timed reading comprehension subtask, disaggregated by sex and region. More Class 2 boys scored zero in English (64.7%) than girls (62.5%). However, there were fewer zero scores in Kiswahili (48.1% of the boys and 41.8% of the girls).

Among the regions, Thika and Nakuru had the highest percentage of pupils with zero scores in the timed English comprehension (89.7% and 80.7% respectively). The percentages in Kiswahili were 67.3% in Thika and 60.8% in Nakuru. Nonformal schools in Nairobi had the lowest percentage of zero scores in English (40.8%), while the Nairobi public schools had the lowest percentage of zero scores in Kiswahili (29.6%).

Results for the untimed comprehension passages indicate similar trends in zero scores. For the overall sample, the percentage of pupils who could not answer any question was 72.6 for the English comprehension subtask and 60.5 for the Kiswahili comprehension subtask, as shown in Figure 15.

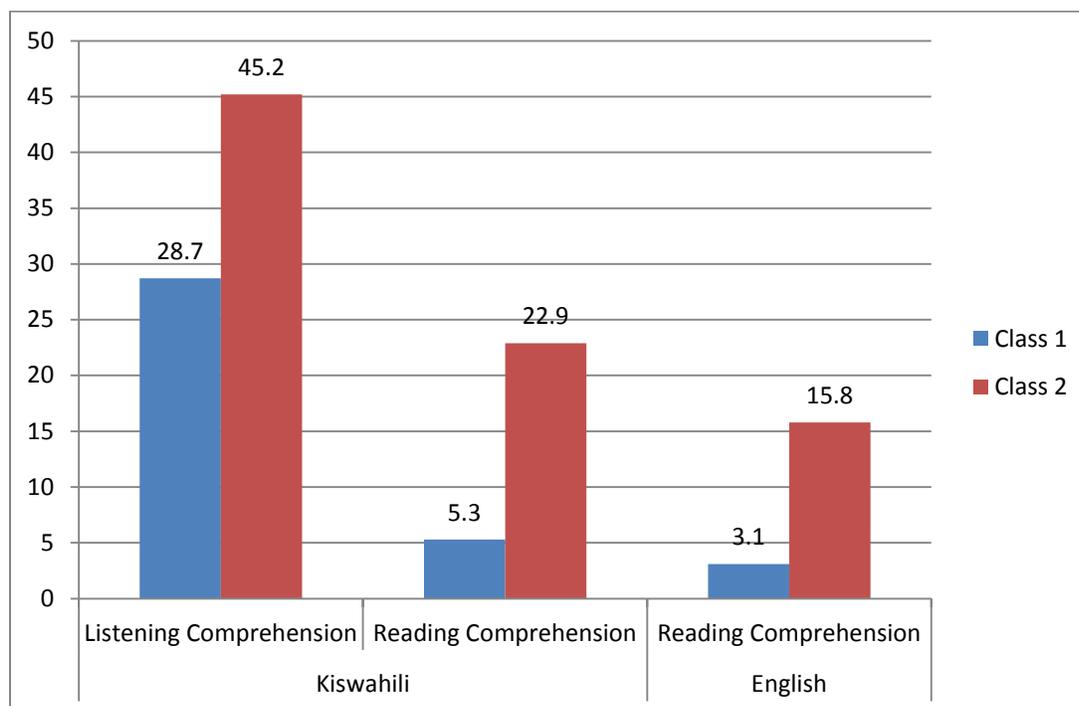
Figure 15. Proportion of pupils unable to answer one question (untimed comprehension)



These results portray a critically dismal scenario for pupils who are expected to learn in multiple languages. They also imply a need to look into the language policy in lower primary more critically, as well as the need for close monitoring at the school level to ensure proper implementation of policies and higher-quality instruction.

In Kiswahili, pupils were assessed in listening comprehension. The assessor read a passage to the pupil and then asked several questions. As Figure 16 shows, pupils scored higher on Kiswahili listening comprehension than on Kiswahili and English reading comprehension. Class 2 pupils scored higher on the Kiswahili listening comprehension (45.2%); Class 1 pupils scored 28.7%. Compared to the timed Kiswahili reading comprehension scores, the Kiswahili listening comprehension scores were about 5 times higher for Class 1 pupils and about 2 times higher for Class 2 pupils. Compared to the timed English reading comprehension scores, the Kiswahili listening comprehension scores were at least 9 times higher and 3 times higher for Class 1 and Class 2 pupils respectively.

Figure 16. Listening and reading comprehension scores by class and language



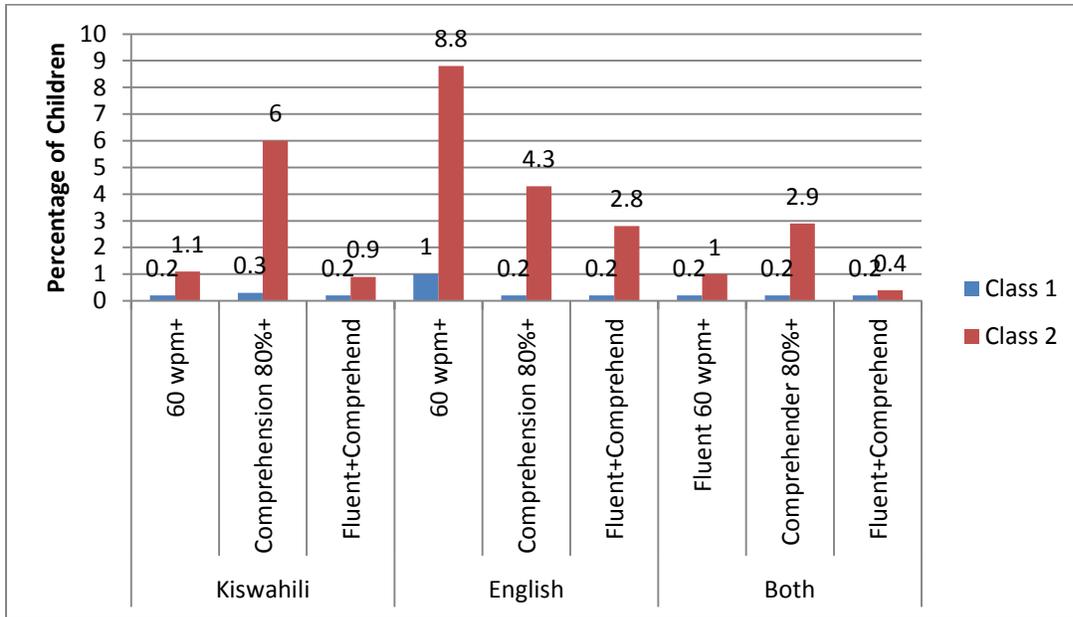
The finding that pupils were able to understand more when somebody read a passage to them is good news. It implies that pupils' comprehension skills in Kiswahili can be improved significantly and within a short time if teachers read simple stories to the children often, and help them with the comprehension strategies that young readers often lack. Reading aloud to children, while providing access to adults' comprehension strategies, improves their comprehension and listening skills and would contribute to a culture of reading at an early age.

3.5 Summary of Findings on Oral Reading Fluency and Comprehension

The findings presented in this section consistently show the critical role of reading fluency in predicting pupils' comprehension levels. Depending on the language policy, the emphasis in Classes 1 and 2 should therefore be on helping children achieve the fluency level they need in order to comprehend at higher levels. Figure 17 shows the performance of the assessed pupils with regard to achieving various fluency and comprehension levels by language and class, namely 60 words per minute and 80% comprehension. In Kiswahili, only 1.1% of Class 2 pupils managed to achieve a fluency level of 60 wpm or higher, while only 6.0% of the pupils in the same class achieved a comprehension level of 80% or more. The respective figures for Class 1 were 0.2% and 0.3%. In English, 8.8% of Class 2 pupils achieved a fluency level of 60 wpm or higher, while 4.3% achieved a comprehension level of 80%. The respective percentages for Class 1 were 1.0% and 0.2%. When we examined the children's outcomes for both languages, only 0.2% of the pupils could read at 60 wpm or higher in both languages and also comprehend at 80% or more in Class 1. The respective percentage for Class 2 was 0.4%. Therefore twice as

many Class 2 pupils could read and comprehend compared to Class 1 pupils. But in summary, only a tiny percentage of Kenyan children could read and comprehend in one or both languages.

Figure 17. Reading fluency and comprehension by class and language



The results indicate low fluency and comprehension levels in both English and Kiswahili for the assessed pupils. Performance was worse for pupils in peri-urban and urban areas of Nakuru and Thika. Children in nonformal schools outperformed public schools in both Kiswahili and English fluency and comprehension. Although the fluency levels in Kiswahili tended to be lower than English, the benefits of learning in Kiswahili were noted by the higher scores in reading comprehension. The achievement of pupils at various reading and comprehension benchmarks is discouraging, implying that effective strategies and interventions will have to be put in place to approach what would be considered reasonable standards in Classes 1 and 2.

4. Early Grade Mathematics Assessment (EGMA) Results

Previous research has shown that children develop mathematical skills even before they begin formal schooling. It has also been noted that children from resource-scarce countries and poor backgrounds begin school with more limited mathematical skills than children in the developed world (National Council of Teachers of Mathematics [NCTM], 2008). Although the tendency in developing countries is to support small groups of needy children, early interventions must be geared toward entire systems, as all children face similar difficulties in reading as well as numeracy. It is important to assess children's current mathematical knowledge at a young age so that measures to improve their mathematical skills are put in place early enough (Griffin & Case, 1997).

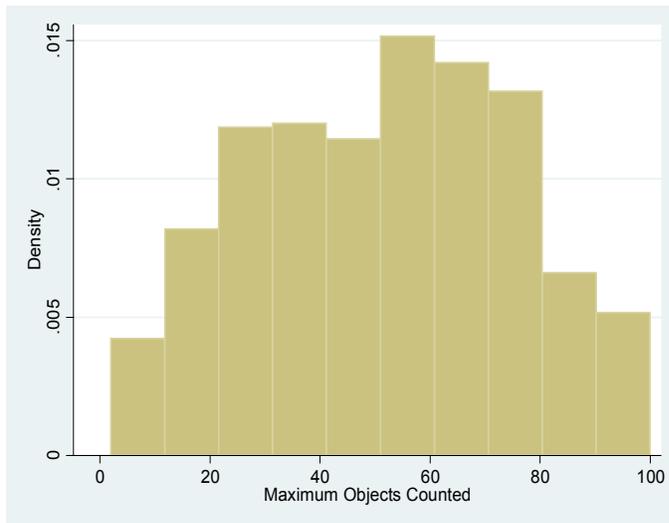
According to the Kenya Institute of Education, the mathematics curriculum in Kenya should empower pupils to think logically and analytically; improve their problem-solving skills; and enable them to make rational decisions. The Early Grade Mathematics Assessment is a useful tool for assessing pupils' mathematics outcomes. Available empirical research suggests that valid mathematics instruments help teachers and systems identify specific areas where pupils need support (Gersten, Jordan, & Flojo, 2005). As indicated in Section 2, the baseline study used an EGMA-based tool that was adapted to the prevailing social economic and cultural environment in Kenya. Care was taken to align the tool with the national curriculum developed by KIE for use in Classes 1 and 2. Pupils were given the option to choose either English or Kiswahili as the language of assessment, to control for effects of language on performance.

Like EGRA, EGMA is a criterion type of assessment: It is designed to compare an individual pupil's performance to specific criteria or mastery of a set of subtasks. The EGMA tool used in Kenya assessed pupils on rational counting; number identification; quantity discrimination, missing number; addition levels 1 and 2; subtraction levels 1 and 2; and word problems. It was a one-on-one assessment with some of the subtasks timed at 60 seconds. The EGMA baseline results are presented below by subtask, disaggregated by class, sex, and other variables of interest.

4.1 Rational Counting

Pupils were requested to count circles that had been printed on a sheet of paper, arranged in rows and columns. Counting is a basic task that most pupils acquire early in preschool. It is memory based and therefore most of the pupils assessed were able to count well. As Figure 18 indicates, the pupils' counting ability is a fairly normally distributed function, as would be expected for this age of pupils. Summary results for the overall sample showed that the average number of objects counted by the assessed pupils was 51.8 with a standard error of 1.19. The confidence interval was between 49.4 and 54.3.

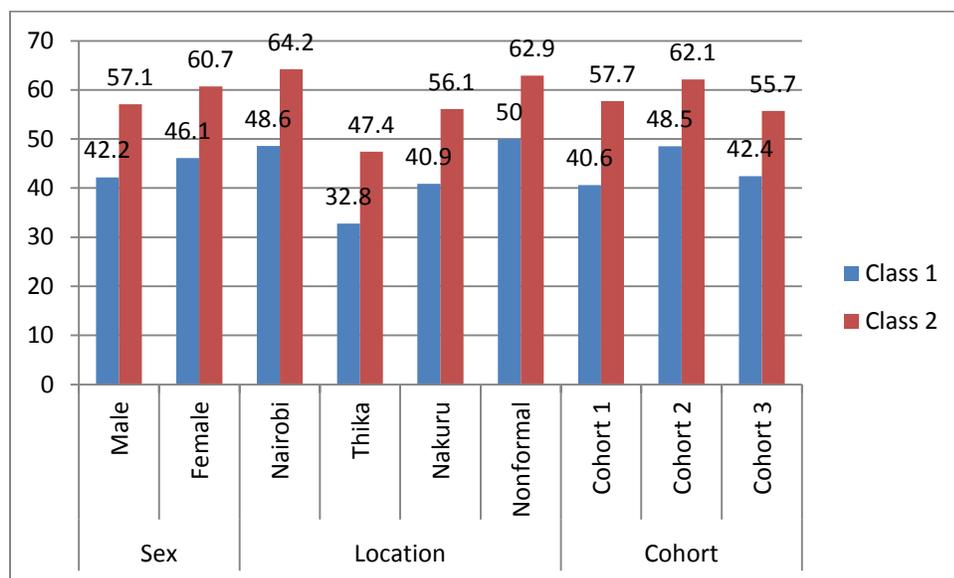
Figure 18. Overall scores on rational counting



However, there were some notable differences in the counting abilities of pupils. Class 2 pupils (not shown) were counting at an average of 60.5 objects compared to 46.1 for Class 1 ($t = 21.1, p = 0.00$). Girls performed better (54.8) than boys (51.8) and this was statistically significant ($t = 4.42, p = 0.00$). A significant difference ($t = 8.6, p = 0.00$) was also noted between counting ability among pupils in public schools (50.0) and pupils in nonformal schools (56.1), with nonformal pupils outperforming formal pupils by 6.1 numbers.

Figure 19 reveals significant differences in rational counting among pupils in Nairobi, Thika, and Nakuru, with pupils in nonformal and public schools in Nairobi able to count much higher than those in either Thika or Nakuru. We found that girls could count higher than boys by 3.9 numbers in Class 1 (p -value $<.01$) and by 3.6 numbers in Class 2 (p -value $<.05$), and that while the pupils in Cohort 2 outperformed the other cohorts on this subtask, the difference was not statistically significant in Class 2 (p -value $.11$) but it was in Class 1, by 7.1 numbers in both cases (p -value $<.05$).

Figure 19. Means for rational counting, by region



As was noted in the reading fluency and comprehension discussions above, nonformal schools performed better than public schools. Again, the reasons for this phenomenon are not clear, given that children from these schools come from economically disadvantaged backgrounds and have few amenities at school. The commitment of teachers and involvement of parents have been suggested as contributing factors, although more research under the PRIMR Initiative may shed light on this question.

4.2 Number Identification

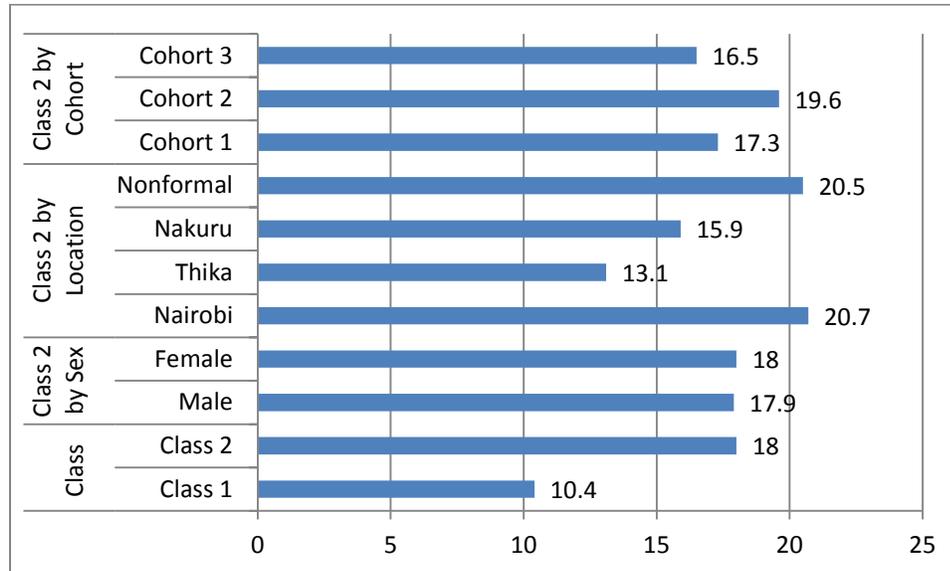
For the EGMA number identification subtask, pupils were asked to identify and name 20 different numbers that were randomly selected and placed in a grid. The objective of the number identification subtask is to determine the pupils’ knowledge of written symbols in mathematics and their ability to identify and orally name them accurately and fluently. This subtask was timed at 60 seconds; the assessor prompted the pupil to move to the next number if there was no response within 5 seconds.

For the overall sample (not shown), the pupils correctly identified an average of 14.4 numbers with a standard error of 0.53. The confidence interval was 13.3–15.5. The percentage of pupils who could not identify a single number was small (0.9%). The 75th percentile was 54.6 numbers per minute, with 63.2 numbers per minute as the highest score.

While there were no significant differences in number identification between boys and girls, Figure 20 indicates that Class 2 performed much higher than Class 1, identifying 7.6 more numbers per minute ($F = 536.68, p < 0.001$). In Nairobi, the difference between Class 2 pupils in nonformal schools (20.5) and public schools (20.7) was marginal, as consistently noted in the EGMA subtasks. However, Class 2 pupils in public schools in Thika (13.1) and Nakuru (15.9)

scored significantly lower compared to Class 2 pupils in both public and nonformal schools in Nairobi.

Figure 20. Number identification scores, by region, sex, and class



Variability in scores among the cohorts was similar, implying that the assumption of homogeneity of variance was not violated (compare Table 17). However, pupils in Cohort 2 identified 2.6 more numbers per minute than did those in Cohorts 1 and 3, which was statistically significant (at the .10 level).

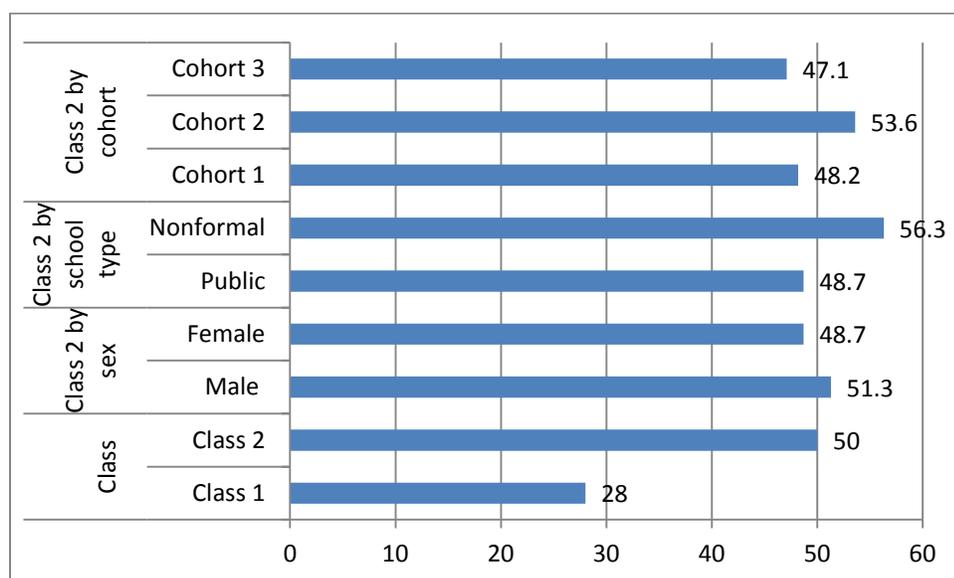
4.3 Quantity Discrimination

The quantity discrimination subtask measured pupils’ ability to make judgments about differences in quantities by comparing pairs of different numbers. Clarke and colleagues (2008) have observed that young pupils’ use of numerals to compare different quantities demonstrates a critical link to effective and efficient counting strategies to solve problems. In the baseline, pupils were presented with 10 pairs of numbers and requested to point and tell the assessor which of the two numbers was bigger. This subtask was not timed, but assessors prompted the pupils to move on to the next pair of numbers if there was no response within 5 seconds.

The average score for this subtask for all pupils was approximately 39.5% correct. The standard error was 0.017 and the confidence interval was 37.1%–41.9%. A proportion of pupils guessed, and therefore the average correct score includes an element of guessing. This implies that pupils are struggling with place value and mental math, which is a critical skill for future success in math. The proportion of pupils not able to identify any number was 10.2%, while 3.2% of the pupils scored all 10 items correctly (not shown). The proportion of pupils who scored 80% or more on this subtask was 13.1%.

Figure 21 shows the number discrimination scores disaggregated by sex, class, school type, and cohort.

Figure 21. Distribution of number discrimination scores



As expected, the largest difference was between Class 1 and 2 pupils, who scored an average of 28.0% and 50.0% items correct respectively ($F = 460.74, p < .001$). The performance between pupils in Class 2 in nonformal schools (56.3%) and public schools (48.7%) was also significantly different ($F = 16.37, p < .001$). Although the differences among pupils in Class 2 in Cohorts 1, 2, and 3 were not practically large (48.2%, 53.6%, and 47.1% respectively), pupils in Cohort 2 scored statistically significantly higher than pupils in Cohorts 1 and 3 ($F = 4.67, p < .05$). There were only small differences in performance between girls and boys on this subtask, with boys outperforming girls by 2.6% ($F = 4.49, p < .05$).

4.4 Missing Number

During the EGMA, pupils were presented with a string of three numbers with the first, middle, or last number in the string missing. The assessor instructed them to name the missing number in the series. Although this subtask was not timed, the assessor prompted the pupils to move to the next item if there was no response within 3 seconds.

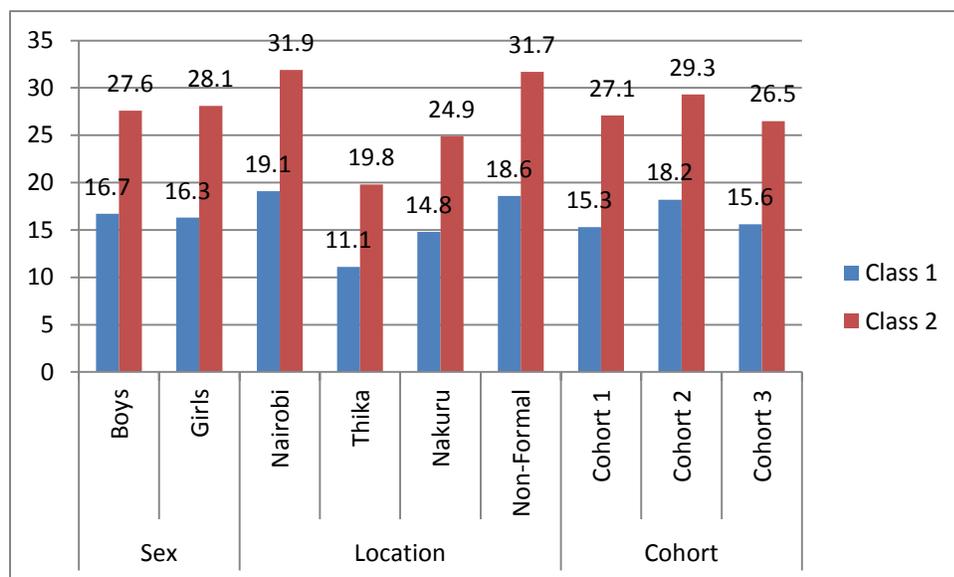
According to Clarke and Shinn (2004), children in early classes should be able to count by ones, twos, fives, and tens, as well as identify missing numbers, thereby strategically demonstrating their knowledge of the relationship between numbers arranged in a simple series. The Class 2 KIE curriculum requires pupils to be knowledgeable in ordering and sequencing numbers. This subtask was therefore contextually relevant and represents an important prerequisite to multiplication and complex addition operations.

For the baseline assessment, pupils were given 10 items to solve by identifying the missing number in a series. The average score for this subtask was 22.4% correct with a standard error of 0.06 and a confidence interval of 21.3–23.5 (not shown). While there were no significant differences between boys and girls (Figure 22), the difference in performance between Class 1

(5.1%) and Class 2 (11.3%) was statistically significant ($F = 363.87, p < .001$; see also Annex B).

Among the regions, Class 2 pupils in Nairobi’s public schools (31.9%) and nonformal schools (31.9%) performed significantly better than pupils in Thika (19.8%) and Nakuru (24.9%); see Figure 22. The differences in performance among pupils by cohort was statistically insignificant.

Figure 22. Missing number scores by sex, class, school type, and cohort

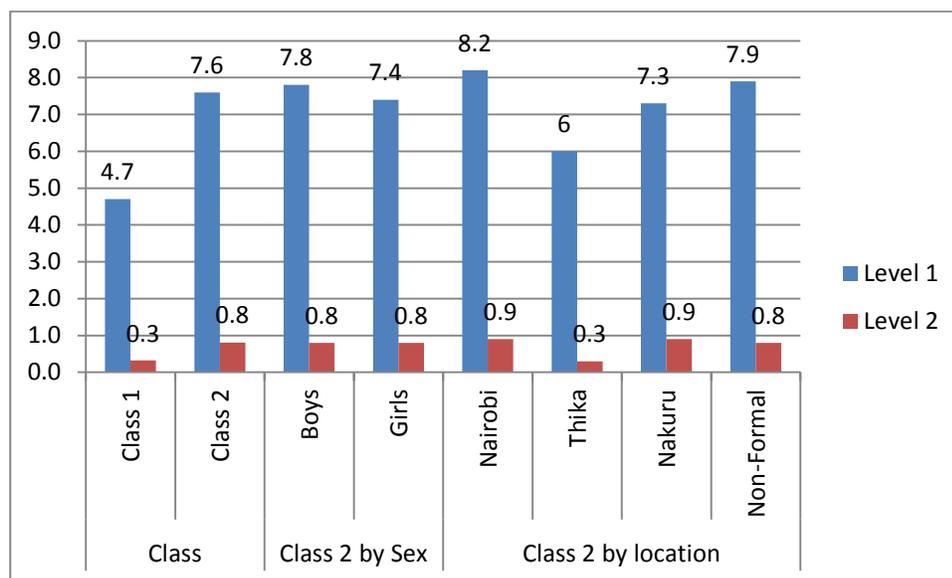


4.5 Addition, Levels 1 and 2

Existing literature indicates that children tend to have a rudimentary idea of addition even before starting formal schooling. For example, they are able to appreciate the relationship between addition and “more” when one pupil is given extra sweets. Earlier studies on the subject focused on children’s ability to solve addition problems. Some of the abilities assessed in these studies included the time it took to solve a problem, the size of the problem that was solved, and the strategy used in solving the problem (Groen & Parkman, 1972; Groen & Resnick, 1977). These are still important issues that EGMA assesses in an attempt to identify the most effective ways of teaching children how to add accurately and quickly.

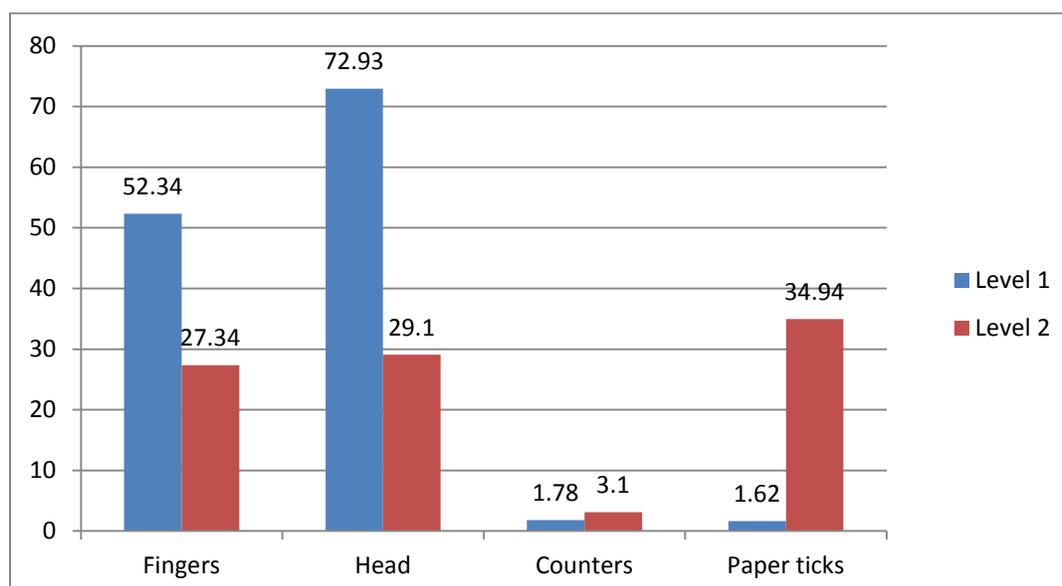
For the baseline, pupils were assessed on how many addition sums they could correctly solve in a minute. Level 1 consisted of 20 sums. The pupils were shown a visual representation of the items on a laminated stimulus sheet and asked to say the answers orally in either Kiswahili or English. For level 2, pupils were given five items and allowed to use paper and pencil or counters to solve the problems. This was not timed. The assessors also noted the strategies pupils were using to solve the problems. The key summary statistics for all the pupils are presented in Figure 23.

Figure 23. Summary of addition results, levels 1 and 2



Results indicate overall poor performance on addition problems for this cadre of pupils. For level 1 addition, the mean was 6.4 sums per minute, which only translates to 25.4% correct; for level 2, the mean score was a dismal 0.61 sums per minute (12.2%). The assessors noted the strategies pupils were using to add and these are indicated in Figure 24. For level 1 addition, the majority of pupils were using their heads to solve the problems (72.9%), and the other common method was counting using their fingers (52.3%). For level 2 addition problems, pupils used fingers, head, or paper ticks at almost equal frequency. Counters were used the least in both level 1 and 2 addition problems.

Figure 24. Strategies used by pupils in addition levels 1 and 2 problems



These results suggest that pupils use very inefficient strategies for basic addition problems. Pupils performed much more poorly on level 2 addition problems because they required more efficient strategies to compute the outcomes than did the level 1 problems. For level 2 problems, for example, pupils used a great deal of time making marks on paper and then counting when solving problems involving two digit numbers. Similarly, the use of fingers to add becomes difficult for numbers beyond 10. It is also likely that many pupils did not have any strategy for computing the problems and hence guessed the answers, getting most of them wrong.

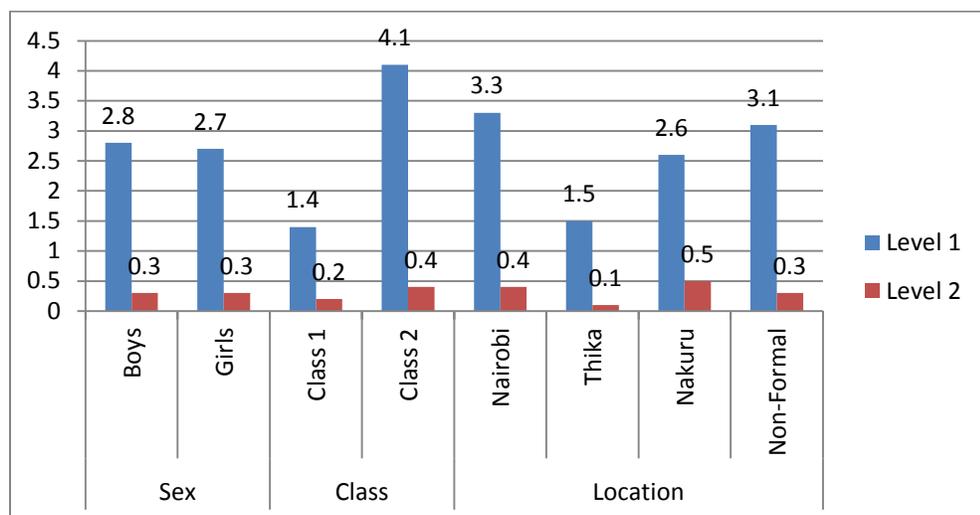
4.6 Subtraction

As was noted in the addition section, children who may not even have started formal school tend to have some idea of the process of subtraction by equating it to “taking away” such that one is left with fewer objects. However, subtraction tends to be an abstract concept for the majority of pupils in the lower levels. Pupils also tend to have fewer strategies for solving subtraction problems than addition problems (Reubens & Crouch, 2009).

For the baseline, pupils were assessed on how many subtraction problems they could correctly solve. This subtask was also presented in two levels. Level 1 consisted of 20 subtraction problems that pupils were required to solve. They were shown a visual representation of the subtraction problems on a laminated stimulus sheet and asked to say the answers orally in either Kiswahili or English. The level 1 subtraction subtask was timed at 60 seconds. For level 2, pupils were presented with five subtraction problems and allowed to use paper and pencil or counters to solve them. This part of the subtask was not timed. The assessors also noted the strategies pupils were using to solve the problems.

Figure 25 shows the results of the subtraction subtask disaggregated by sex, class, and region. In both level 1 and 2 subtraction problems, there were no statistically significant differences between girls and boys although boys performed marginally better than girls in level 1 subtraction problems. For level 1 subtraction, Class 2 pupils scored about three times better than Class 1 pupils (4.1 and 1.4 respectively), and this was statistically significant ($t = 31.72, p = 0.00$). Similarly, for level 2 addition, Class 2 pupils did better than Class 1 pupils (0.4 compared to 0.2; $t = 6.65, p = 0.00$).

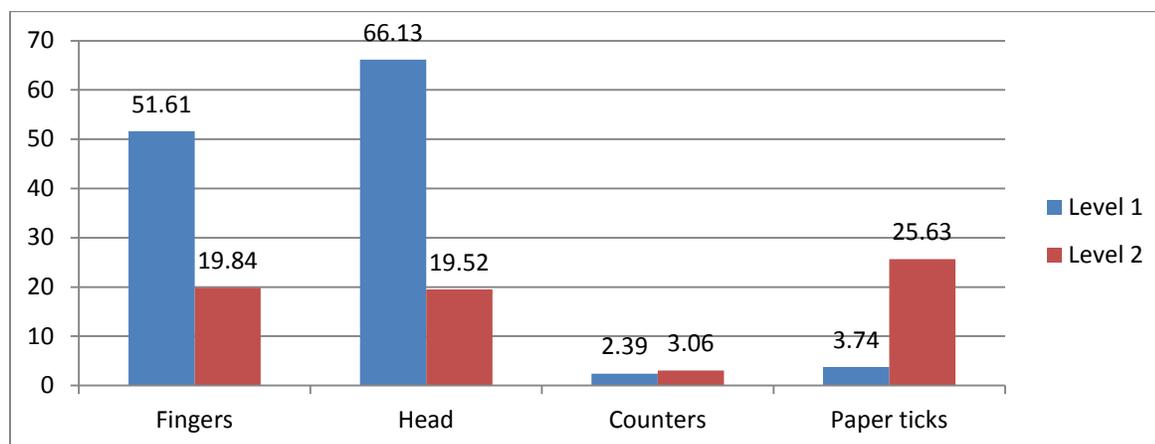
Figure 25. Summary of subtraction fluency results, levels 1 and 2



Pupils performed poorly on the level 1 subtraction subtask (2.8) compared to the level 1 addition subtask (5.1) ($F = 487.6, p = 0.00$), not shown. The situation was the same between level 2 addition (0.6) and level 2 subtraction (0.2) ($F = 161.12, p = 0.00$). The differences by location and class are presented in Figure 25 and follow the patterns presented in the rest of the report.

The assessors noted the strategies pupils were using to subtract, and the results are shown in Figure 26. The most frequently used strategies for solving level 1 subtraction problems were head (66.1%) and fingers (51.6%). For level 2 subtraction problems, 25.6% of the pupils used ticks on paper while those who used fingers and their heads were 19.8% and 19.5% respectively. Counters were the least frequently used method in solving subtraction problems, a situation that was also noted in the addition subtask discussion above. This is surprising because one would expect teachers to encourage pupils to use counters for both addition and subtraction.

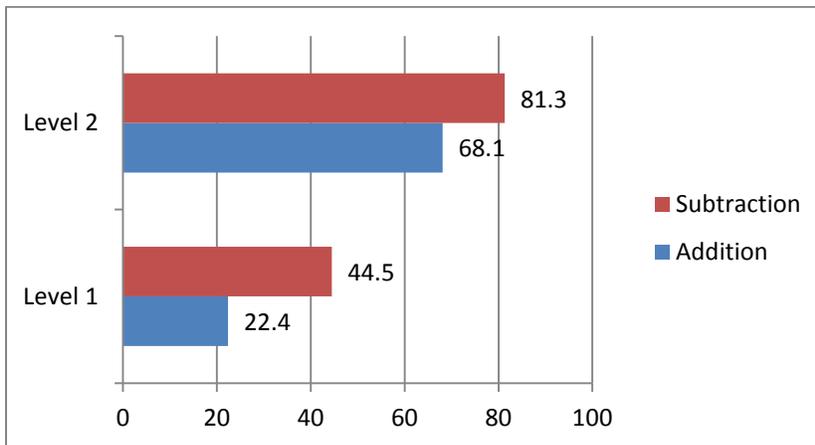
Figure 26. Strategies used by pupils in subtraction levels 1 and 2



Once again, the baseline results suggest that pupils used inefficient strategies for both the addition and subtraction operations. Subtraction was a more difficult operation for the sampled group of pupils and would require the use of more effective strategies to help the pupils solve problems quicker and more accurately. As noted under the addition subtask, use of tick marks and fingers limits the pupils to solving simple problems involving one digit, as the time required to use these methods for larger numbers would be prohibitive.

Figure 27 shows the percentages of pupils with zero scores on both sections of the subtraction and addition subtasks. It is discouraging to note that 81.3% of the sampled pupils could not solve a single level 2 subtraction problem. Similarly, 68.1% of the pupils could not solve a single level 2 addition problem. It is also worth noting that a full 44.5% of Class 2 children could not answer one subtraction problem. These results indicate that the sampled pupils were not able to translate the skills they had gained in counting and number work into solving problems. In addition and as already noted, the pupils' speed and accuracy in solving subtraction and addition problems were heavily hindered by the inefficient strategies that they were using. These are issues that can be addressed through instruction. Note that the practice of teaching mathematics principles solely by following the chapters in a textbook does not equip pupils with the skills they need to solve subtraction and addition problems.

Figure 27. Pupils with zero scores on addition and subtraction subtasks



4.7 Word Problems

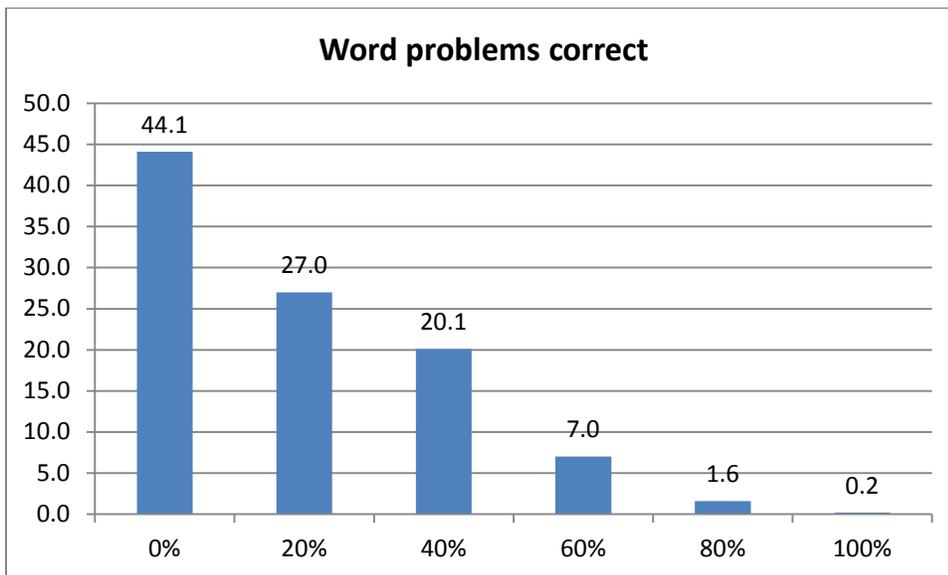
The last subtask in the baseline EGMA tool was the word problem subtask. In this subtask, the assessor read a simple mathematical problem while the pupil was listening. The assessor used either Kiswahili or English, whichever the pupil was more comfortable with. This is important because EGMA aims to test not the pupils' language skills but rather their computational and number-sense skills. Testing pupils in word problems is perhaps the most researched area of the EGMA tool in the Western world. Nearly 20 years ago, Carpenter and Moser (1984) suggested

that there was, by then, a large body of knowledge that consistently showed important trends on the topic. One key finding across the years has been that the semantic structure of the word problems does unconsciously influence the child's response.

Riley and Greeno (1988) later suggested that the construction of the semantic structure of a word problem presented to the pupil also seemed to influence the strategies that the pupil was likely to choose to solve the problem even on the spur of the moment. These issues are as relevant today as they were 15 or 20 years ago and do indeed determine the validity and reliability of EGMA data, if care is not taken to minimize them. Other researchers have found a correlation between pupils' level of number knowledge and their ability to solve word problems successfully.

For the baseline, pupils were asked five questions that required them to use a combination of cognitive skills derived from their knowledge of subtraction, addition, and—to a lesser extent—division principles. Prior to asking the questions, the assessor gave the pupil paper and pencils and counters to use if they chose to. This subtask was not timed but the assessor prompted the pupil and moved on to the next problem if there was no response within 5 seconds. The overall mean for this subtask was 1.0, with a standard error of 0.04 and a confidence interval of 0.90-1.1. Figure 28 shows the percentage frequency distribution of scores for all pupils.

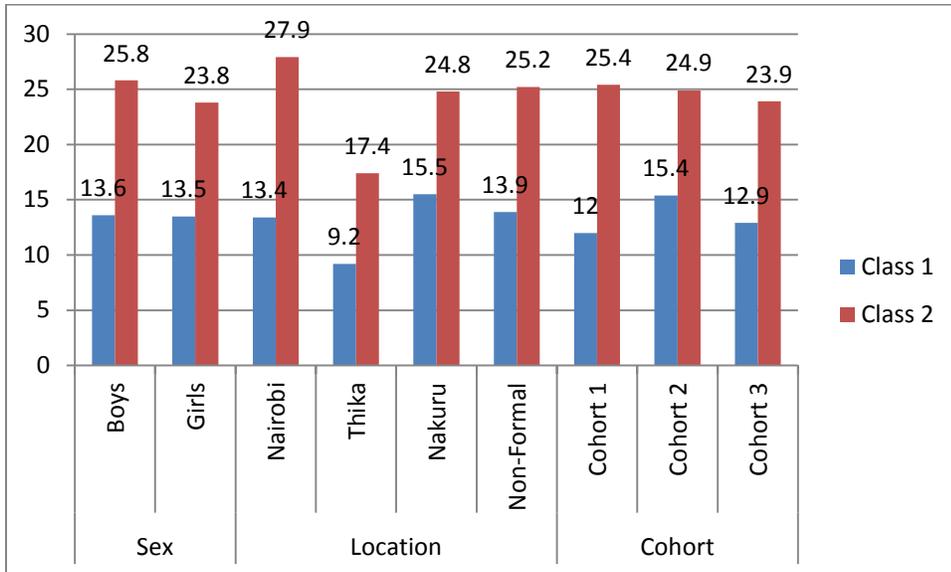
Figure 28. Frequency distribution of scores for the word problem subtask



A conspicuous result is that 44.1% of all pupils assessed could not answer a single word problem correctly. Another way of looking at it is that more than 4 pupils out of 10 scored zero on this subtask. Further, 91.3% of all pupils assessed scored two or fewer word problems and only 8.8% of the pupils managed to correctly solve three or more word problems. Once again, these are rather distressing results and indicate the dire need to develop and apply effective strategies for improving the problem-solving skills of pupils at this age.

To check for further disparities, data were disaggregated by sex, class, region, and cohort. The results are presented in Figure 29. There was no difference between boys and girls in their performance on word problems (p -value .28). Class 2 performed almost twice as well as Class 1, at 24.8% compared to 13.6%, and the difference was statistically significant ($F = 116.14, p < 0.001$); see Annex B. In the regions, Thika performed worse than public and nonformal schools in Nairobi. Nakuru also performed better than Thika. There were no differences by cohort.

Figure 29. Word problem scores disaggregated by sex, class, location, and cohort



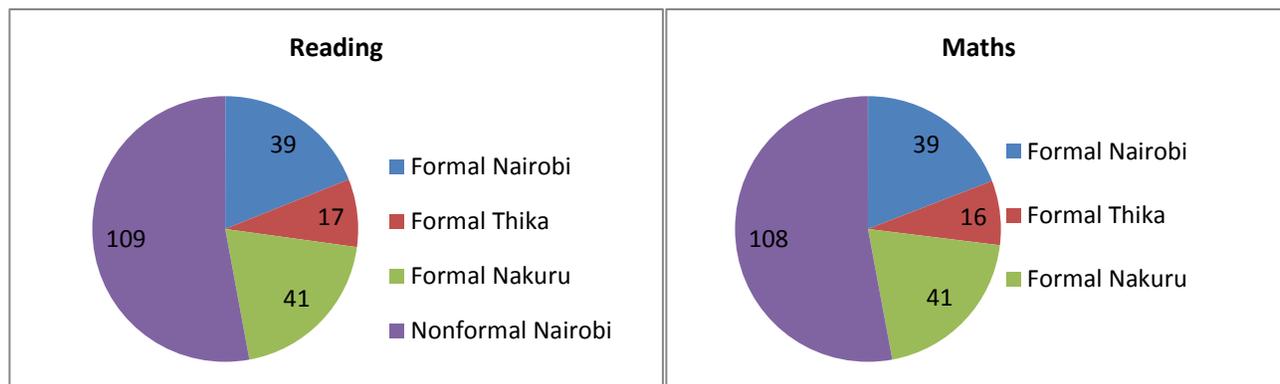
5. SSME Results

In the section that follows, we present the findings from a substantial data set collected at the same time as the EGRA and EGMA results. The tool used was the Snapshot of School Management Effectiveness (SSME), which provides a substantial amount of research evidence on the relationship between school characteristics and pupil outcomes. Data presented here come from data collected using head teacher interviews, teacher interviews, pupil background questionnaires, reading classroom observations, maths classroom observations, and classroom inventories of physical characteristics in classrooms. The section is organized substantively, allowing the researchers to inform the discussion around educational quality in lower primary classrooms in Kenya.

5.1 Classroom Observations

Figure 30 below presents the number of observations undertaken in Nairobi, Thika, and Nakuru, by subject. There were two more reading classroom observations than maths observations, with the additional two observations undertaken in Thika and nonformal schools in Nairobi. With the 206 reading classroom observations and 204 maths classroom observations, the baseline SSME study systematically observed more than 12,000 minutes of classroom instruction.

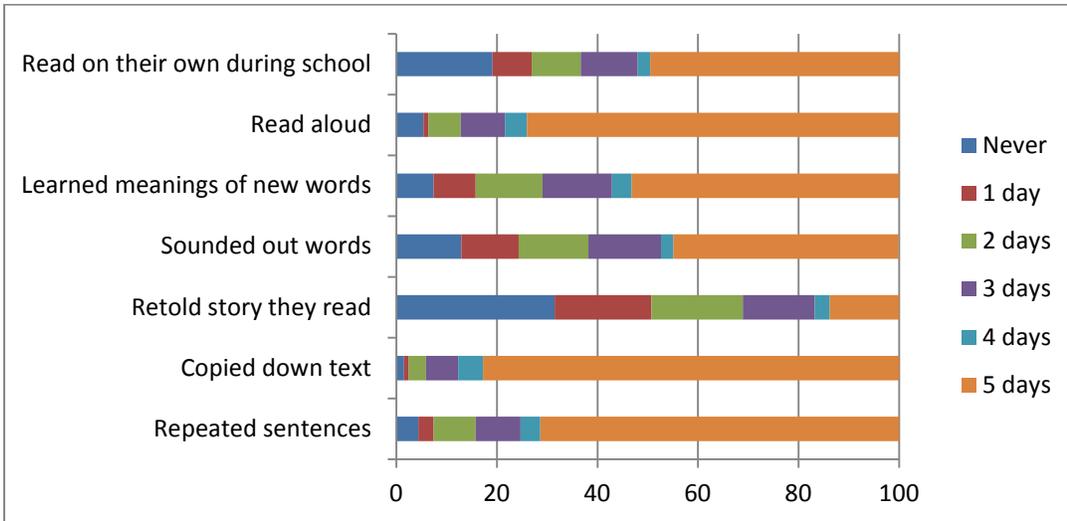
Figure 30. Number of reading and maths classroom observations, by county



We were interested in understanding what instructional methods teachers purported to use in classrooms. This was in order to triangulate what methods the teachers claimed to use against what methods they actually used. The interview questions listed potential methods and asked the frequency (in numbers of days per week) with which each of the methods was used in English classrooms (Figure 31). The most frequently occurring methods were reading aloud, copying down text, and repeating sentences, all of which were reported by 60% or more of teachers to have occurred every day, with copying text reported to have occurred every day by more than 80% of the sample of teachers. On the other hand, more than 30% of teachers reported to never have children retell stories that they read, and more than 15% of teachers never had pupils sound out words, or read on their own during school. This suggests that the predominant methods in

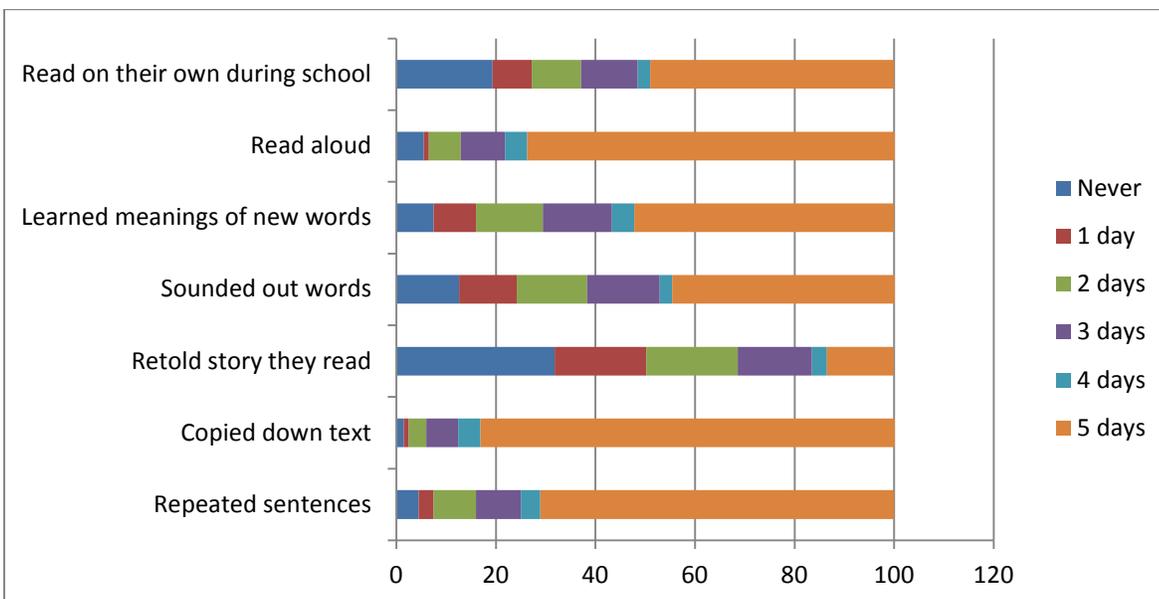
English literacy classrooms are recall based, and not much emphasis is placed on the skills of reading, particularly alphabetic principle, reading comprehension, or vocabulary.

Figure 31. Frequency of various instructional methods in English class



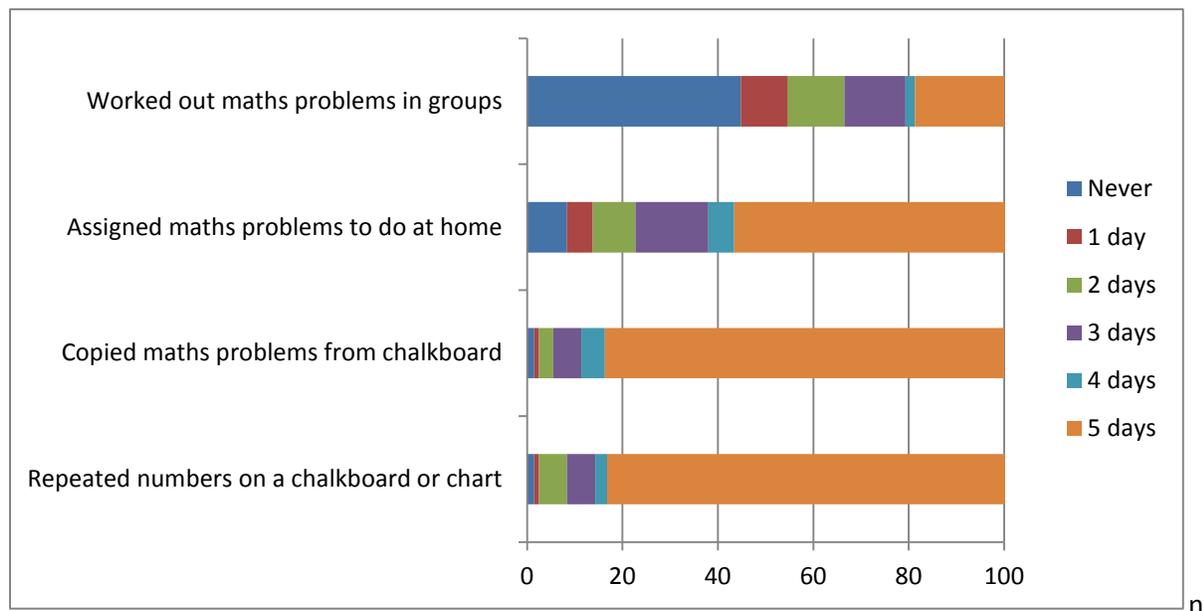
The story of Kiswahili classroom instruction, as reported by the teachers, is very similar. Figure 32 shows that the methods that occurred every day for more than 60% of teachers were the same: reading aloud, copying down text, and repeating sentences. The strategies that occurred least frequently were retelling stories that were read, reading on their own in school, and sounding out words, with learning the meanings of new words nearly as infrequent.

Figure 32. Frequency of various instructional methods in Kiswahili class



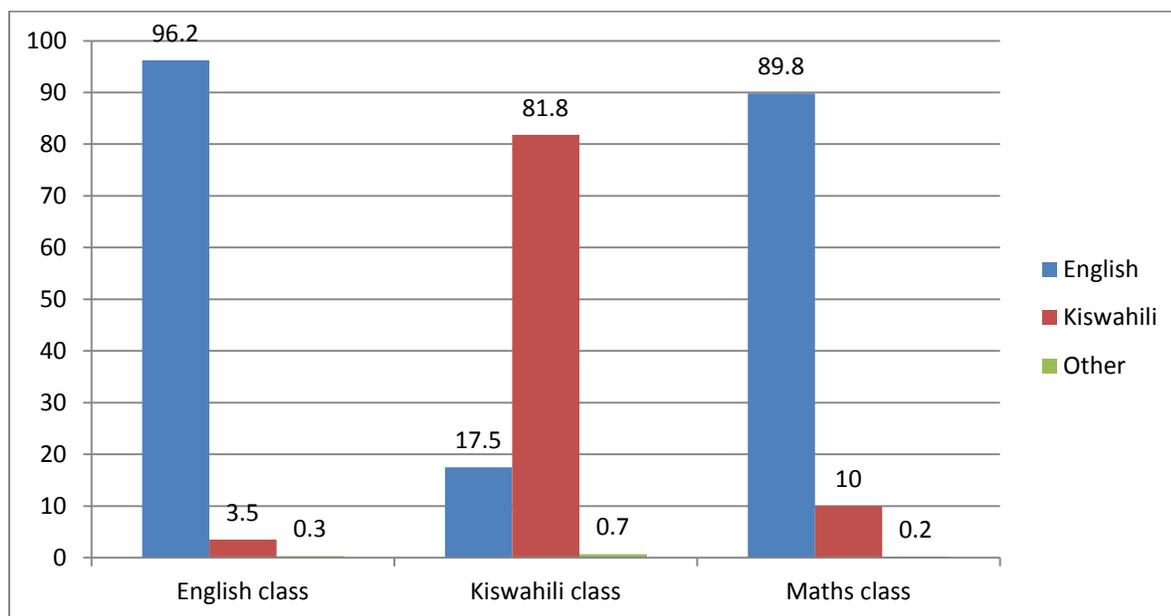
While the methods investigated differed for maths instruction, the principle was generally the same. Teachers were asked how frequently they used a few strategies, and we found that more than 80% of teachers reported repeating numbers on a chalkboard or chart every day, and copying maths problems from the chalkboard every day (Figure 33). More than half of the sample of teachers assigned maths problems to do at home. On the other hand, more than 40% of teachers reported never assigning maths problems to be done as groups, and less than 20% reported doing group work in maths every day. The implication, therefore, is that maths instruction is focused on recall and practice, with less emphasis on the activities designed to foster creative thinking.

Figure 33. Frequency of various instructional methods, maths



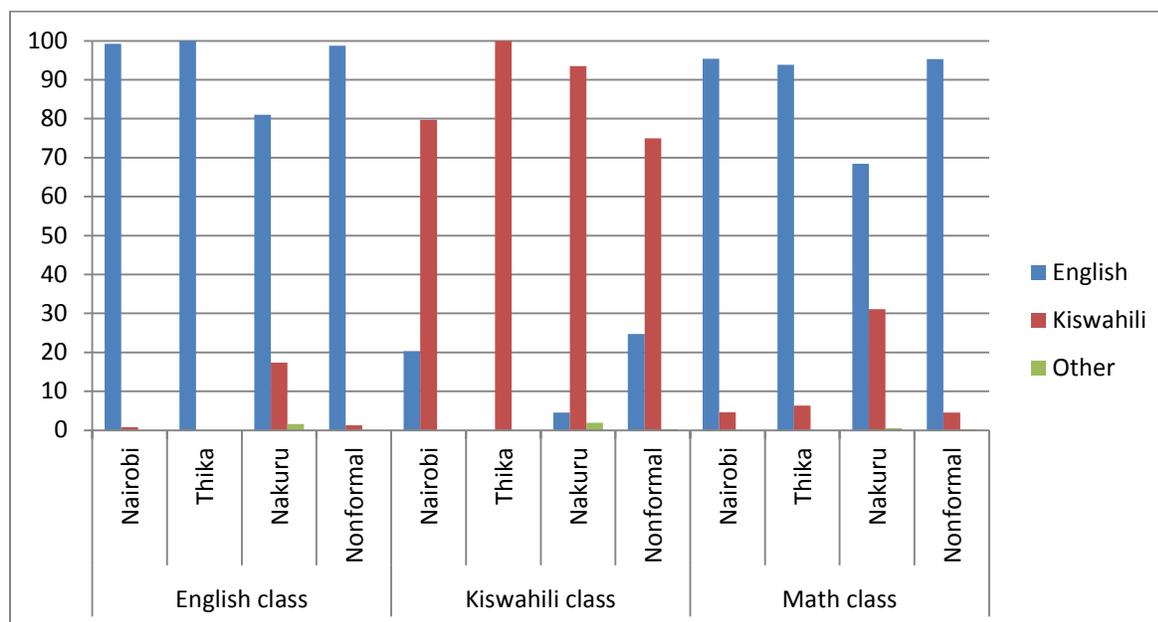
The Kenyan language-of-instruction policy requires that the subject areas be taught in the language of the catchment area. In the PRIMR-supported areas, the language of instruction in the subject areas is supposed to be Kiswahili, as they are urban and peri-urban. Figure 34 shows the language of instruction used in the three subjects we observed. We found that 96.2% of English class was taught in English, while 81.8% of Kiswahili class was taught in Kiswahili. It is interesting that more than one in six observations in Kiswahili class noted that the instruction was in English. Our measures did not differentiate between whether it was proper English or some mixture of Sheng. For maths, we found that, in opposition to the language policy, 89.8% of time was spent using English, and only 10% in Kiswahili. This finding is very similar to what RTI's previous research found in Central and Nyanza, where the subject areas were predominantly taught in English, even in rural areas (Piper, 2010).

Figure 34. Language usage in Class 1 and Class 2, by subject



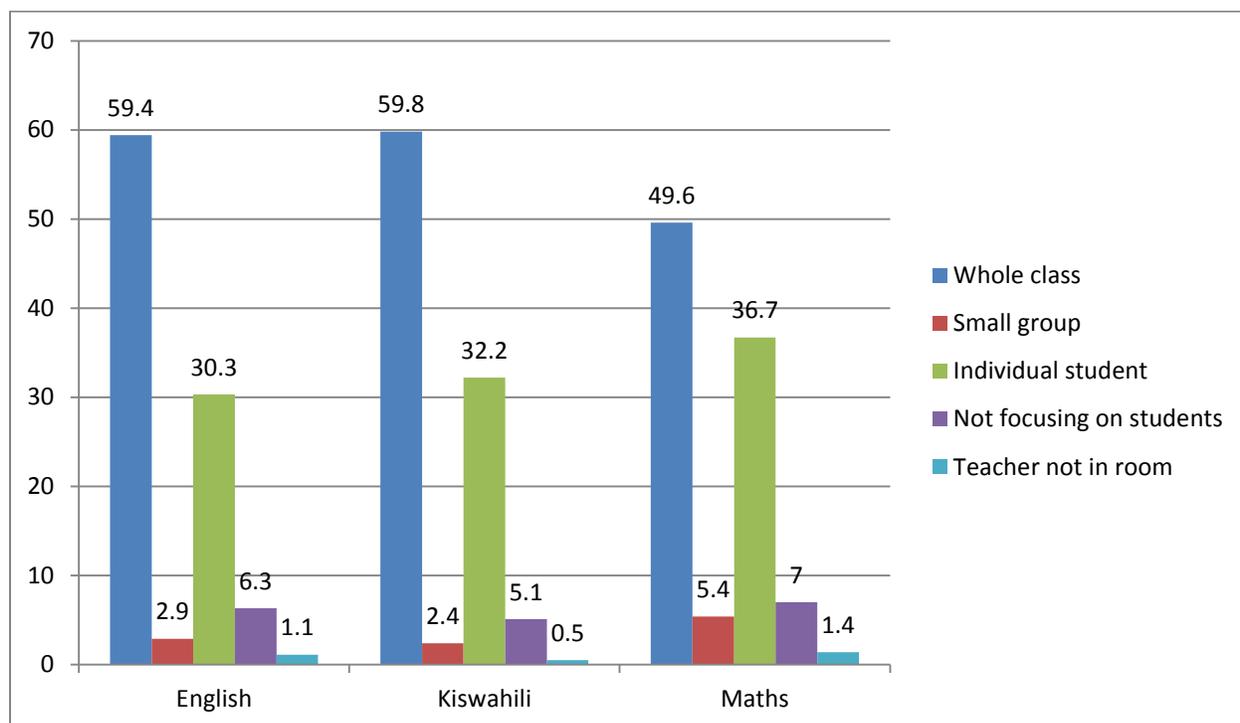
The figures above indicate average language-of-instruction observation rates across the locations in the PRIMR baseline. Figure 35 presents the use of language by subject for each of the four locations in the PRIMR study. The figure shows that, for English class, very close to 100% of the time was spent using English. On the other hand, in English class in Nakuru, just under 20% of time was spent using Kiswahili rather than English. For Kiswahili class, both Thika and Nakuru used Kiswahili more than 90% of the time, while nonformal and formal schools in Nairobi used English at least 20% of the time. In maths class, English was used more than 90% of instructional time in Nairobi (formal and nonformal) and Thika. But in Nakuru, teachers used English only about 70% of the time. Note that mother tongues of any sort were used extremely infrequently in any of the classrooms we visited. There were some differences in language usage by location, with Nakuru using more Kiswahili in English and maths than the other locations, and both Nairobi locations using more English in Kiswahili class.

Figure 35. Language use, by county



The baseline data provided classroom-observation-based insight on the focus of teachers in classrooms; see Figure 36. It shows that, for 59.4%, 59.8%, and 49.6% of the time for English, Kiswahili, and maths, respectively, the focus of the teacher was on the whole class. Individual pupils were the attention of the teacher quite often, as well, with 30.3% of English, 32.2% of Kiswahili, and 36.7% of maths instructional time spent with the teacher focusing on individual pupils. Little time was spent in small groups, with only 5.4% of time spent in small groups in maths, and less than half of that in both English and Kiswahili. In fact, for all three subjects, more time was spent *not focusing on pupils at all* than in small groups, with more than 5% of instructional time in all three subjects spent with no focus on pupils.

Figure 36. Teacher focus during classroom observations



Whole-class instruction was by far the most prevalent, as Figure 37 shows in more detail, disaggregated by location. In Nairobi and Nakuru, the largest percentage of time spent in whole-class instruction occurred in English class, while in Thika and nonformal schools the highest percentage was in Kiswahili class. In all four locations, whole-class instruction in maths was the focus of a lower percentage of time. It was only in Nakuru and nonformal schools in maths that whole-class instruction was employed less than 50% of the time.

Figure 37. Teacher focus on whole-class instruction

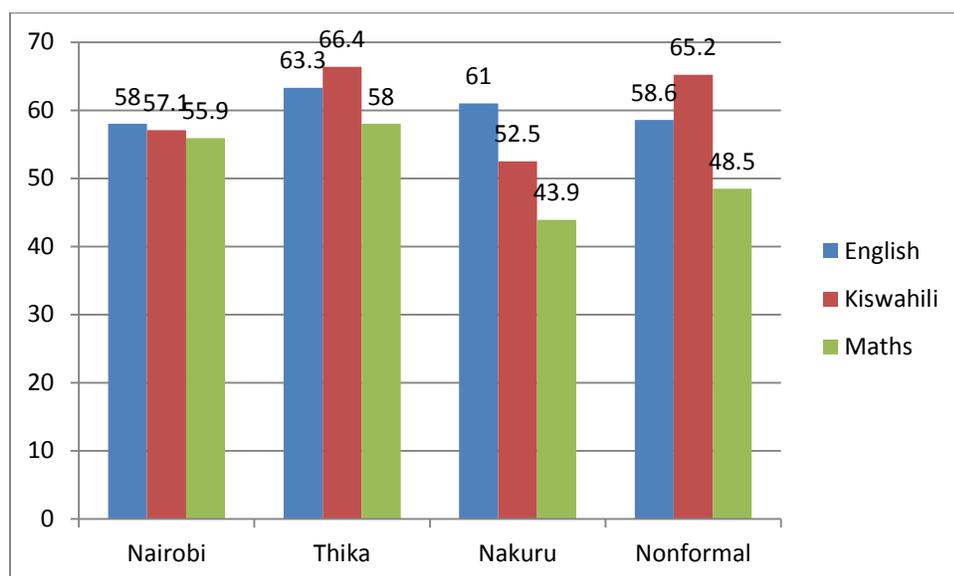
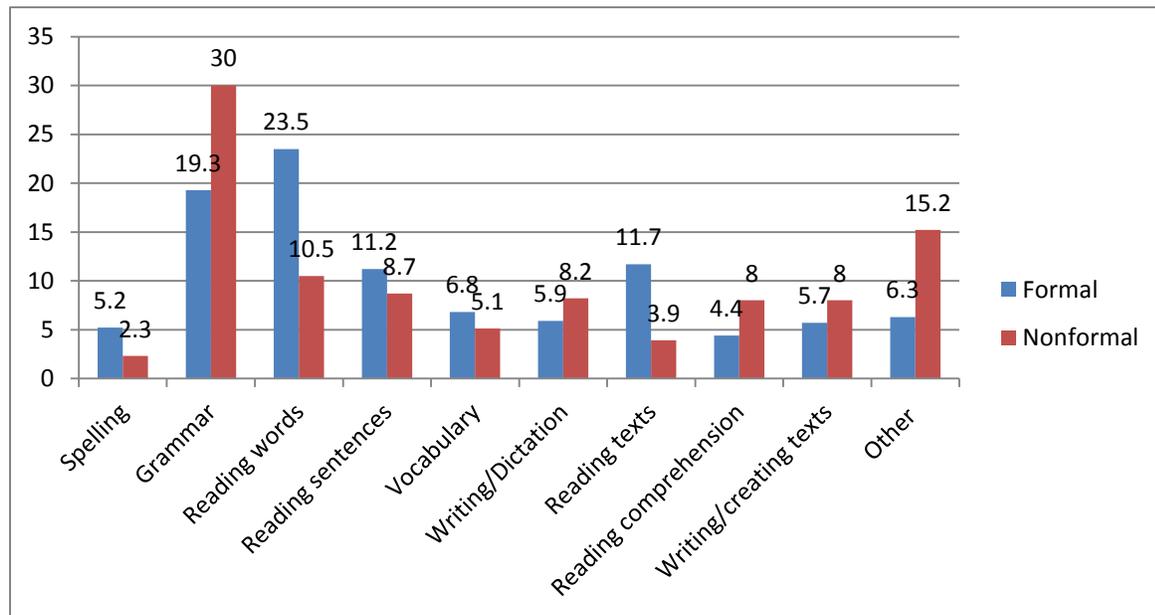


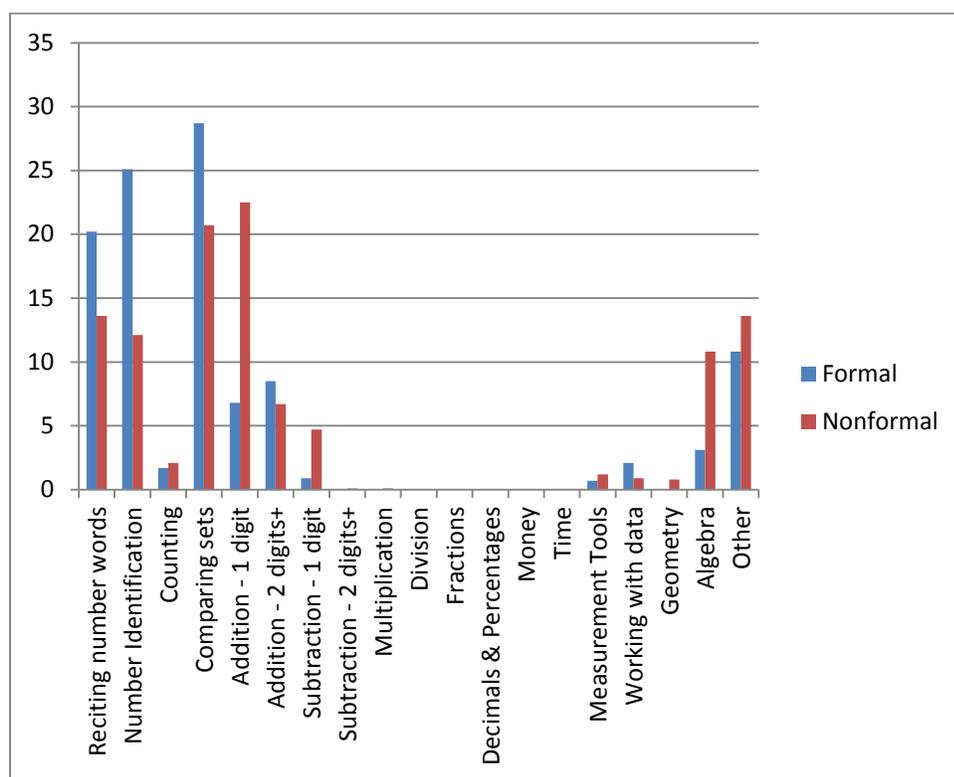
Figure 38 shows how much time (as a percentage) was spent in formal and nonformal schools in instructional content in language classes. In nonformal schools, the largest percentage by far was on grammar (30.0%), with other (15.2%) and reading words (10.5%) large proportions of class time. In formal schools, reading words (23.5%) was significant, as was grammar (19.3%). Far less time was spent on vocabulary, which is particularly important in learning languages that the children do not speak at home; reading texts (although this was more than 10% of instructional time in formal schools); and reading comprehension (less than 10% in both formal and nonformal schools). It appears that, if proportion of class time is used as the measure, Kenyan classrooms focus very heavily on the word level and on grammar.

Figure 38. Instructional content in language classes



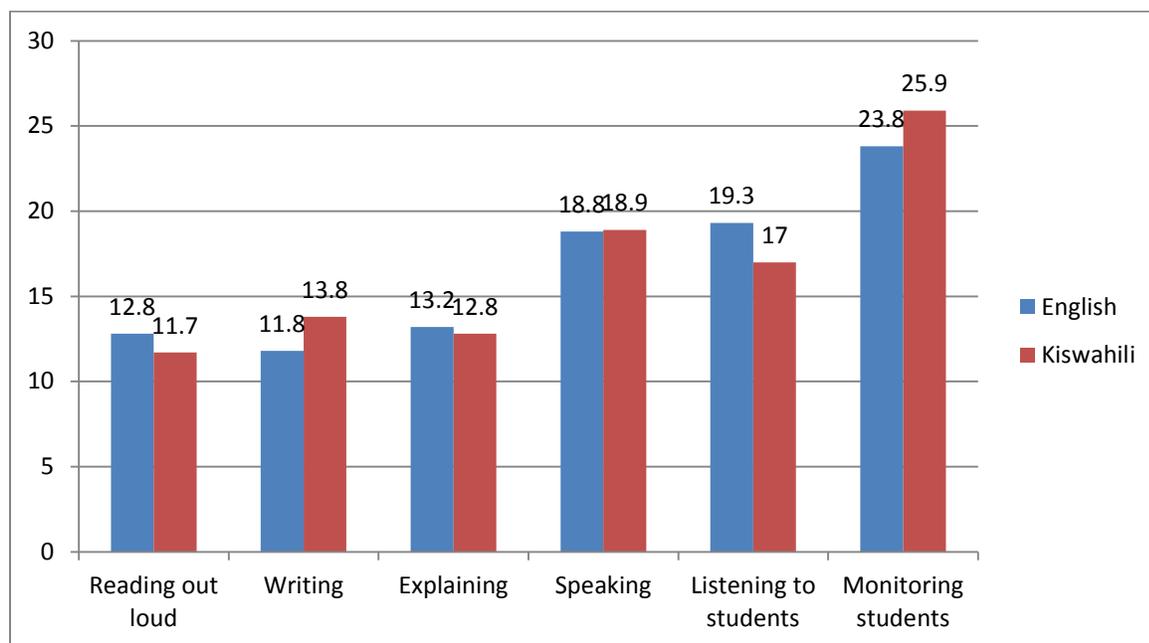
The instructional content of maths classrooms is another area that the baseline data allow us to investigate. We found that in formal schools, the largest proportions of classroom time were spent comparing sets, identifying numbers, and reciting numbers (Figure 39). In nonformal schools, on the other hand, the greatest amount of time was spent doing one-digit addition, followed by comparing sets, reciting numbers, and identifying numbers.

Figure 39. Instructional content in maths classrooms



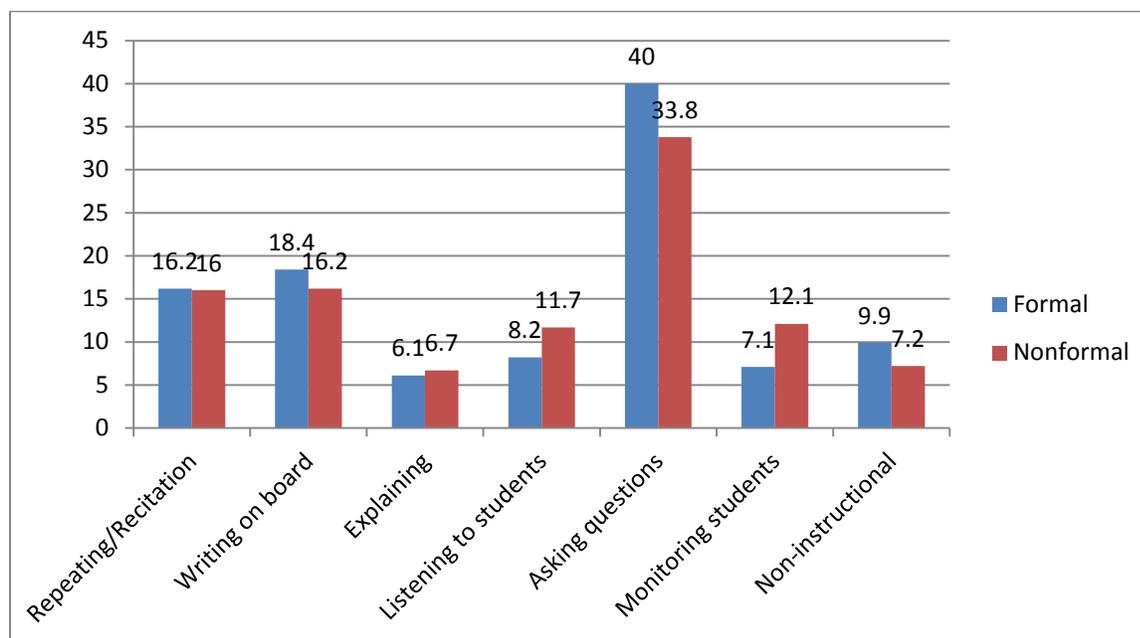
While the figures above focused on instructional content, we were also able to look at the teacher action within each classroom. The data here allow us to understand what actions teachers were taking on the most frequent basis. We found that for both Kiswahili and English classrooms, monitoring pupils took nearly 25% of the classroom time (Figure 40). This was often at the end of the lesson, when children would be working in their seats, and teachers would often be observing them as they did their work, but not always actively watching or helping them. Speaking and listening were also frequent activities. Interestingly for the language observations, the least frequent activity for English classrooms was writing, followed closely by reading aloud, while the least frequent activity by teachers in Kiswahili was reading out loud, followed by explaining.

Figure 40. Teacher actions during language observations



Classroom observations in maths present a different picture. The largest proportion of time was spent in asking questions (Figure 41).

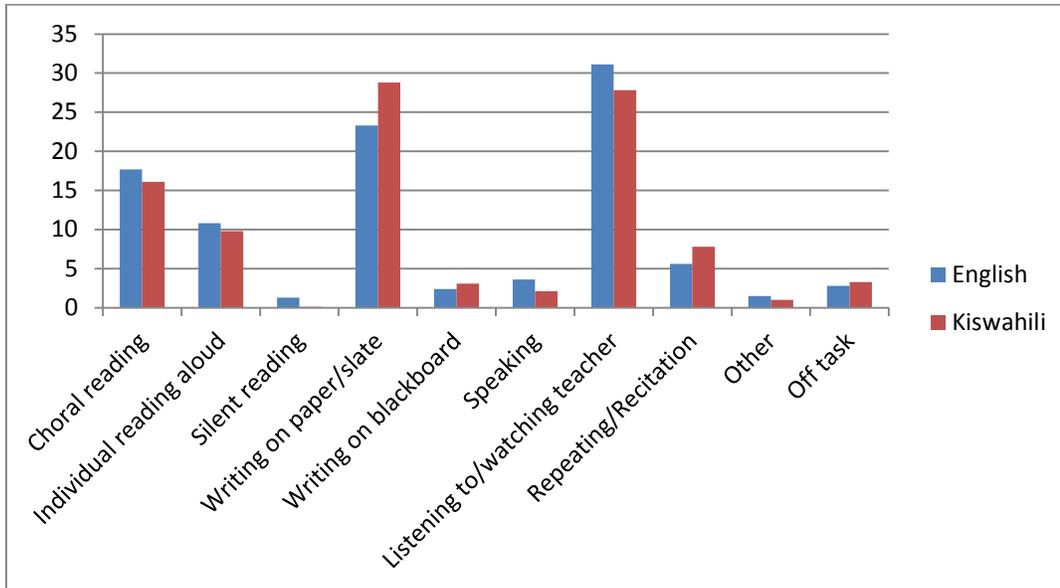
Figure 41. Teacher actions during maths observations



We were also interested in what pupils were doing during class time. We found that the most frequent activities for both Kiswahili and English were writing on paper and listening to and watching the teacher (Figure 42). Choral reading also took up more than 15% of time, and

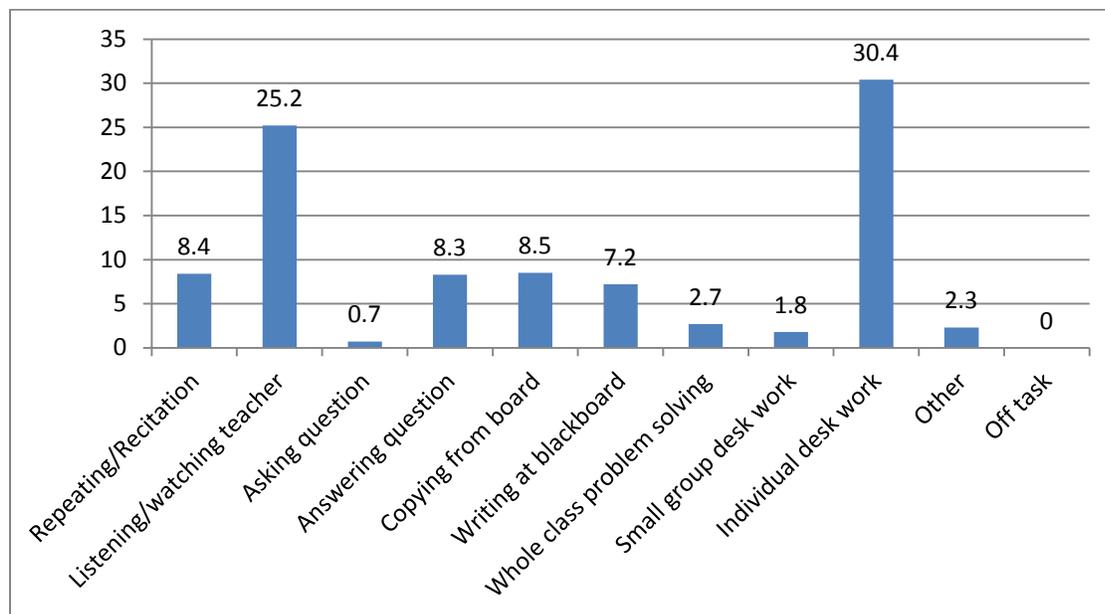
reading aloud was 10% or more. Silent reading was nonexistent in Kiswahili and less than 2% in English. In fact, there was more time spent off task (not teaching) than reading silently.

Figure 42. Pupil actions during language observations



Pupil actions in maths classrooms were also very constrained. More than 30% of instruction was spent on individual desk work, and another 25% on listening to and watching the teacher (Figure 43). This meant that little time was available for answering questions (8.3%), doing problems as a whole class (2.7%), completing small-group desk work (1.8%), or asking questions (0.7%).

Figure 43. Pupil actions during maths observations

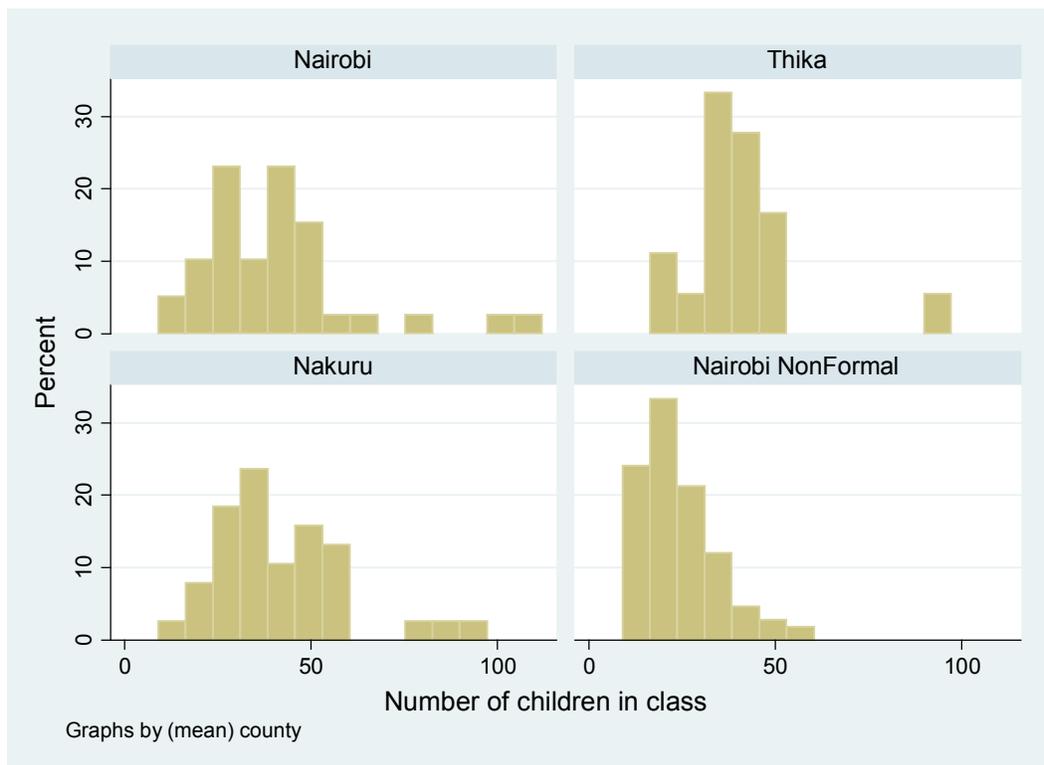


5.2 Classroom Characteristics

The sections that follow present the classroom characteristics of the more than 400 lessons the PRIMR baseline team observed in January 2012. The discussion and figures below investigate the status of classrooms.

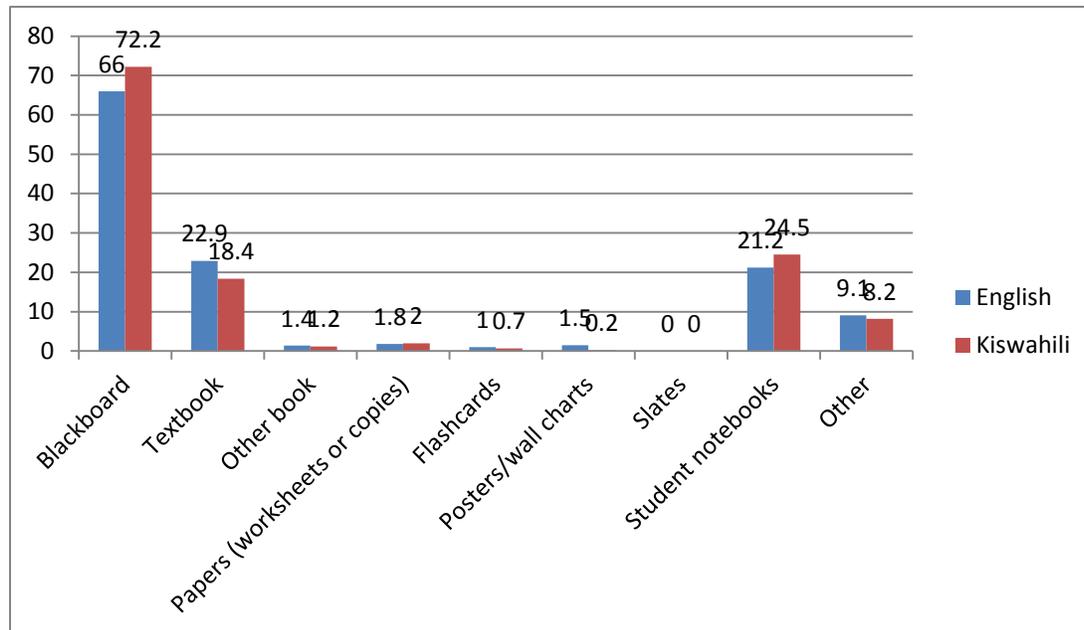
Figure 44 presents histograms of the number of children attending each classroom, by location. The figure shows that the number of children in the vast majority of nonformal schools was far lower than the number of children in any of the formal schools. The attendance averages in Class 1 and 2 were 24.1 in nonformal, and over 40 for all of the formal locations, specifically 42.9, 40.3, and 40.7 in Nakuru, Thika, and Nairobi respectively. While it is clear that the enrolment for the classrooms was quite high, the numbers in the formal schools were not far from what is in the MOE's policy. However, several classrooms in Nairobi and Nakuru, in particular, had more than 50 children. Interestingly, there were no statistically significant differences in oral reading fluency outcomes (in either English or Kiswahili) depending on class size, even when we analysed only within each location. The only notable exception was in Kiswahili in Nairobi ($p = .06$), where class size actually had a positive effect: Every additional 10 children was associated with 0.8 *more* words per minute, rather than less.

Figure 44. Numbers of children in attendance in each classroom, by location



We also investigated closely what materials were used in classrooms. We found three main materials used in both Kiswahili and English classrooms: blackboards, textbooks, and pupil notebooks. Note that the percentages in Figure 45 are frequencies, so this shows that blackboards were used two-thirds of the time or more in both Kiswahili and English class, but textbooks and pupil notebooks were used only 20% of the time. Other books were barely used, just over 1%; and flashcards less than 1% of the time. Therefore, it appears that unless a textbook is of high quality, children will have difficulty meeting the desired reading outcomes.

Figure 45. Materials used in language classrooms



As far as physical facilities were concerned, the data revealed what schools had. Of the schools visited, 80.8% had a girls' washroom, which is a critical item to ensure that girls persist in school (Figure 46). In the nonformal schools, girls' washrooms were much less frequent, at 52.1%. School feeding programs were much more prevalent in nonformal schools (63.9%) than in formal schools (40.8%). Libraries existed in just over a third of nonformal schools and just under a third of formal schools, which is certainly an area to address, even if the solution is not focusing on more physical facilities but instead improving usage of the modest facilities that exist currently.

Figure 46. Facilities available in the observed schools

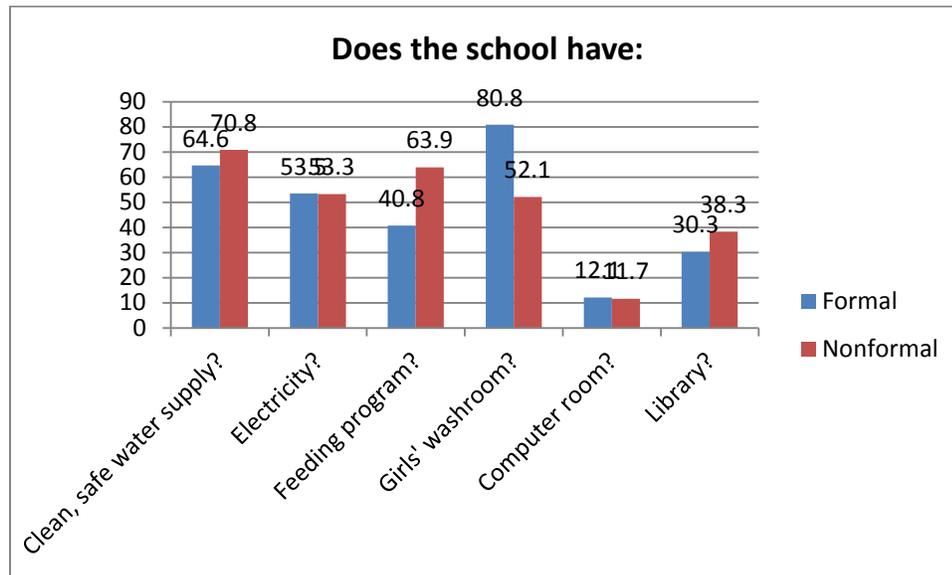


Figure 47 through Figure 49 present the textbook ratios for schools in the various areas. A significant part of the experimental nature of PRIMR is investigating what happens when the textbook ratio is moved to 1:1. Given that the official policy is to have the ratio at 3:1 for Classes 1 through 3, these data, culled from the head teacher questionnaire, help explain what proportion of schools are at 3:1 or better. We found that all four locations had more than 80% of schools at 3:1 or better, but the similarities ended there. The nonformal schools actually had the highest percentage of schools at ratios of 1:1, more than 40%; and both Thika and Nakuru had less than 10%. Geographic differences emerged as well, with textbook ratios in English at 2:1 or less in more than 60% of schools in nonformal and Nairobi, but less than 40% in Thika and less than 50% in Nairobi. Sadly, there were wide gaps in ratios in nonformal schools and in Nakuru, as some schools claimed they had no English textbooks at all. And more than 10% of nonformal schools either had no books or had books at a ratio worse than 10:1. This appears to be an important area of inequality. Schools with good textbook ratios in English also had them in Kiswahili and maths, as the figures below indicate.

Figure 47. Ratio of pupils to textbooks, English

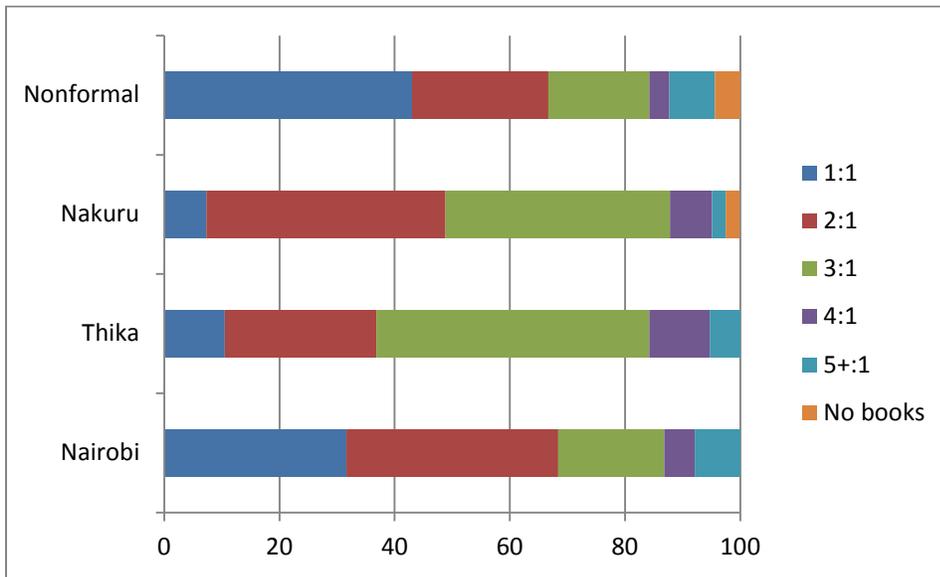


Figure 48. Ratio of pupils to textbooks, Kiswahili

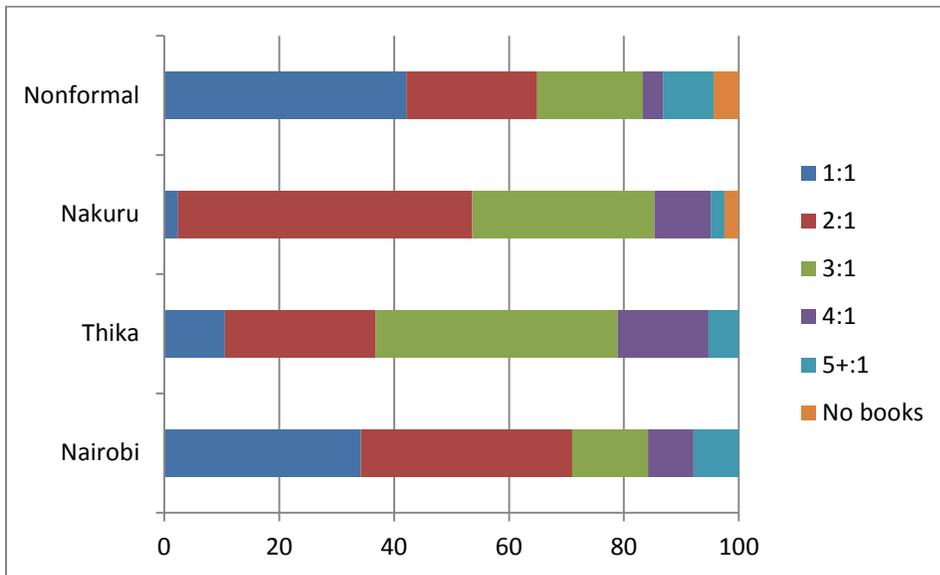
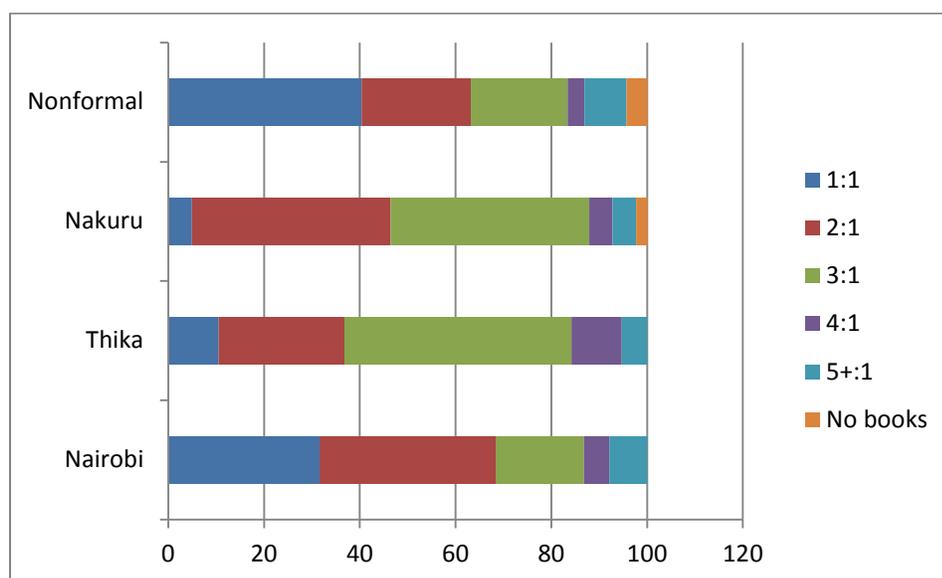
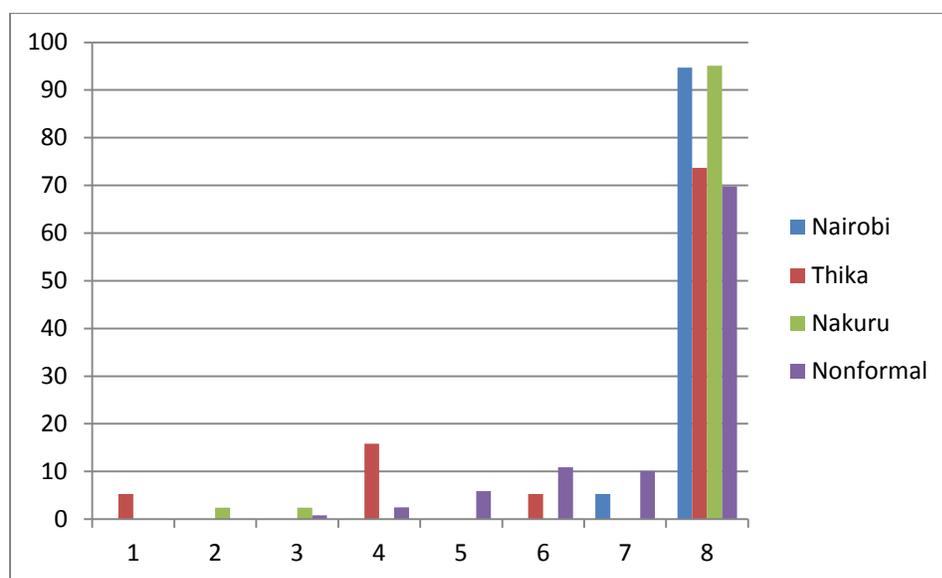


Figure 49. Ratio of pupils to textbooks, maths



We asked head teachers what the highest class taught at the school was. Although we still need to confirm some of the surprising responses from Thika and Nakuru, it appears that more than 90% of schools in Nairobi and Nakuru were primary schools through the entire primary cycle (Figure 50). Only 70% of nonformal schools continued until Class 8, with 10% ending in Class 6 or 7. In addition, in Thika, 15% of schools sampled continued only through Class 4. These schools have very different pressures related to the relationship between quality and KCPE performance, and we argue that the quality of the early learning outcomes depends on the external factors influencing quality.

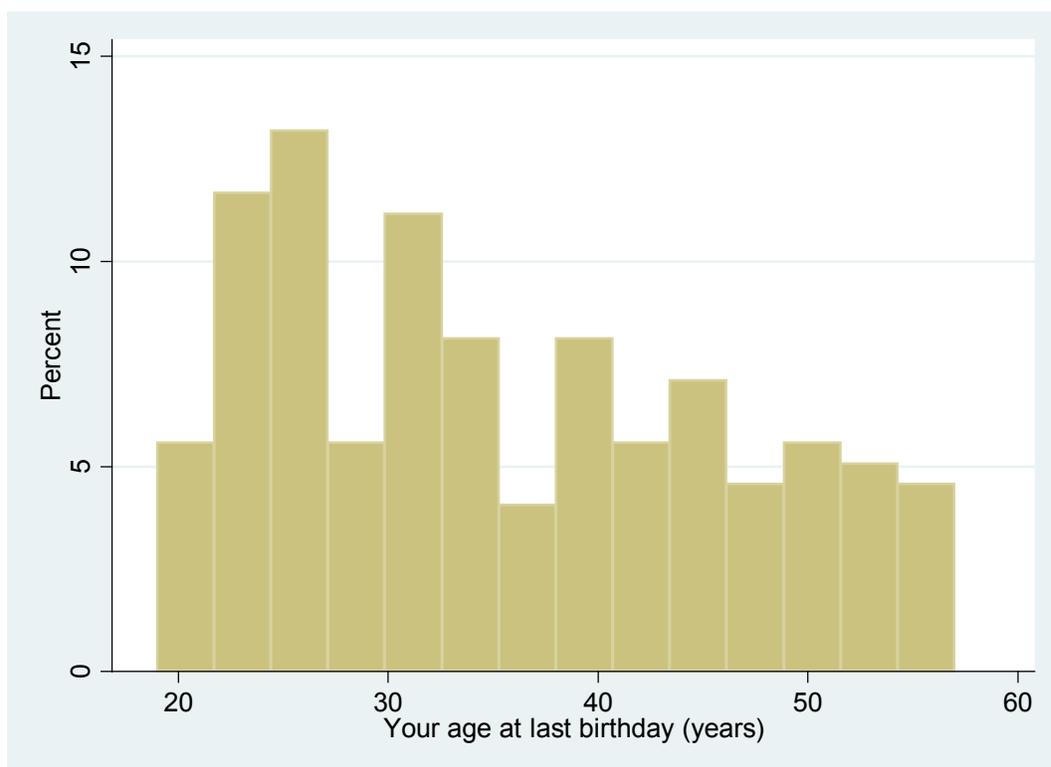
Figure 50. Highest classes taught in observed schools



5.3 Teacher Interview Results

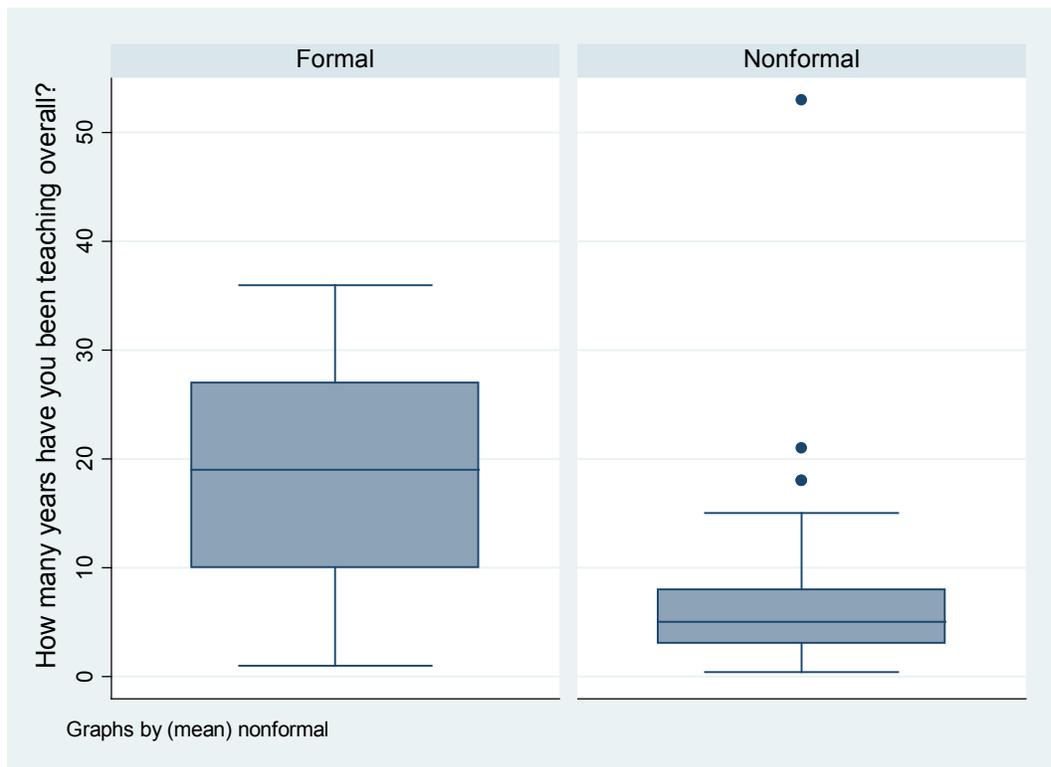
Figure 51 shows the distribution of ages of teachers in the sample. It is not a normal distribution; there were more teachers in their 20s than in any other decade, although many teachers in the sample were nearing 60 years old. If the assumption is that younger teachers are likely to be more flexible in their methods and approaches, then this distribution suggests that significant numbers of teachers are new enough in their teaching methods to have some potential to change. This is an active assumption, though. We will estimate at midterm and endline whether teachers' age had any impact on their ability to change their behaviour in the classroom.

Figure 51. Distribution of teachers' ages



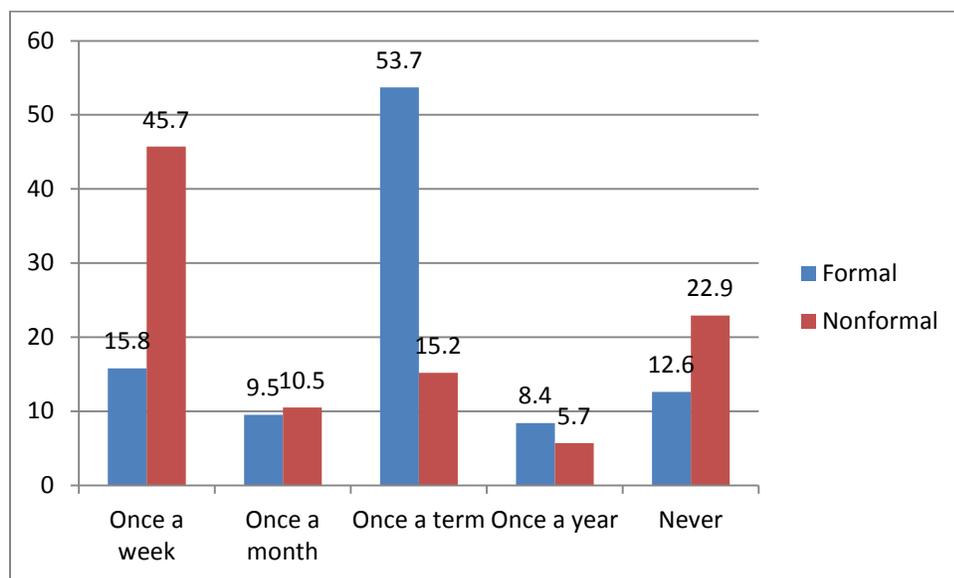
The boxplot in Figure 52 shows the experience levels of teachers in formal and nonformal schools. Although we are not very confident in the response of one outlier teacher in a nonformal school who claimed more than 50 years of teaching experience, it is clear that formal teachers had much more experience than nonformal teachers. Formal teachers had nearly 20 years of experience, while nonformal teachers had less than 5. In fact, the 25th percentile of experience for teachers in formal schools was 10 years, while the 75th percentile for nonformal teachers was less than 10 years of teaching.

Figure 52. Experience levels of teachers, formal and nonformal schools



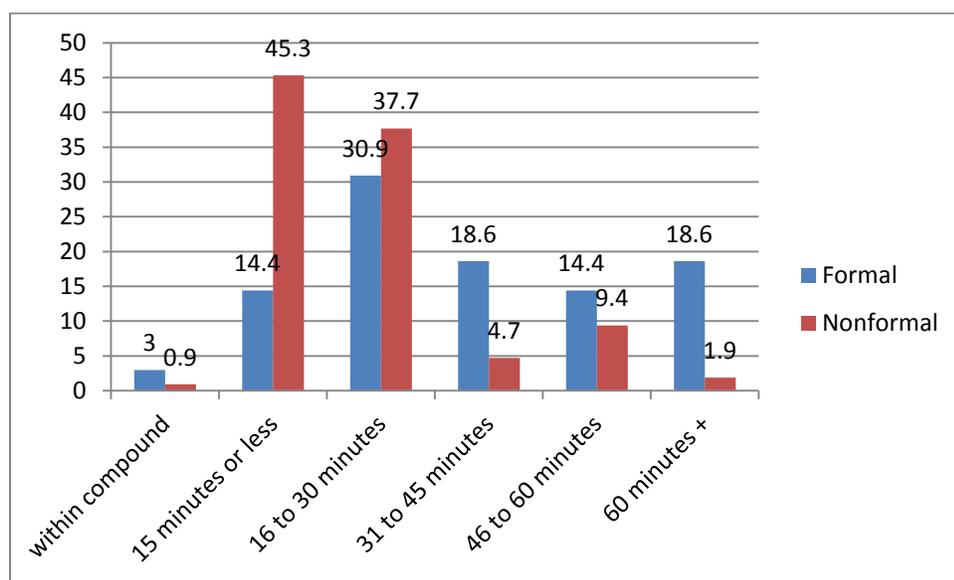
Teachers were asked how often a TAC tutor (or equivalent) visited them in their classrooms. In all, 53.7% of formal teachers noted that they were visited once per term, and an additional 31.3% were visited one a year or never (Figure 53). The summary finding, then, for formal teachers, was that the vast majority of teachers had no one visit them on a regular, even monthly basis. On the other hand, 45.7% of nonformal teachers said they were visited once a week. However, on the other end of the distribution, 22.9% of nonformal teachers were never visited, which was actually more than for the formal teachers. This item seems to be very important, and it is clear that the frequency of visits by formal teachers is far too infrequent to support ongoing instructional change.

Figure 53. Frequency of TAC or other tutor visits, nonformal schools



We asked teachers how long it took them to travel to school, as this item has quite a bit of relationship with the quality of teaching likely to be delivered by teachers. Figure 54 shows the distances travelled, disaggregated by formal and nonformal schools. Note that 51.6% of formal school teachers said it took them more than 30 minutes to travel to school. The corresponding proportion for nonformal schools was 16.0%. This is a remarkable difference, and suggests that nonformal teachers have a much better chance of arriving at school fresh and prepared for the day. Put another way, three times more teachers in nonformal schools than formal schools travelled less than 15 minutes to get to school. This was largely due to the nonformal settlements providing both the schools and the teachers.

Figure 54. Distance traveled by teachers to their school



The PRIMR baseline provided an opportunity to investigate the relationship between listening and reading comprehension, particularly in Kiswahili. Figure 55 presents the comprehension scores disaggregated by class and by county in Kiswahili listening and Kiswahili reading. The green bars present the “comprehension gap” between listening and reading for those particular disaggregations. There was a very consistent 20% gap between listening and reading comprehension in all of the areas. This is an important idea, as it shows that children comprehended oral much better than written Kiswahili. It is clear that pupils require higher-quality instruction for them to be able to understand written text to the same level that they understand what they read.

Figure 55. Comprehension gaps between listening and reading

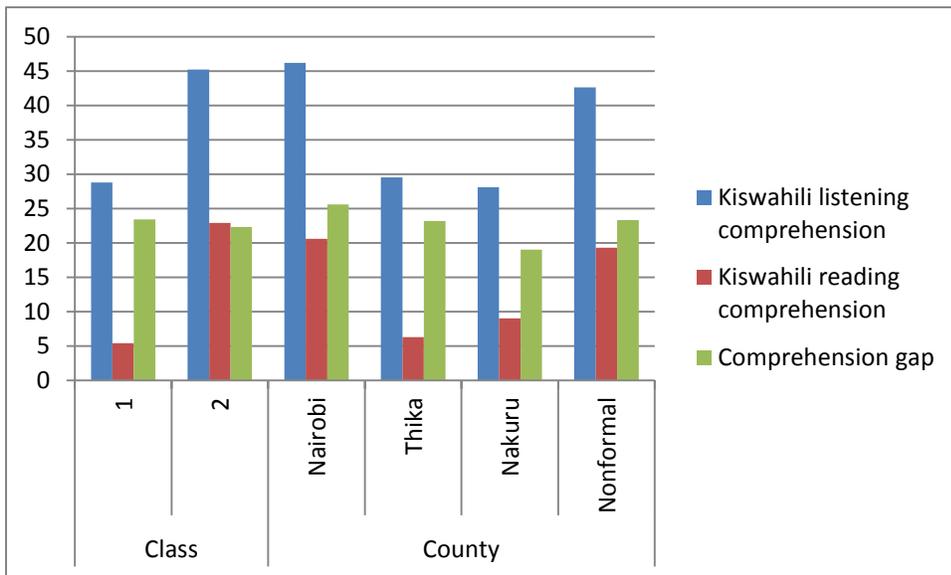
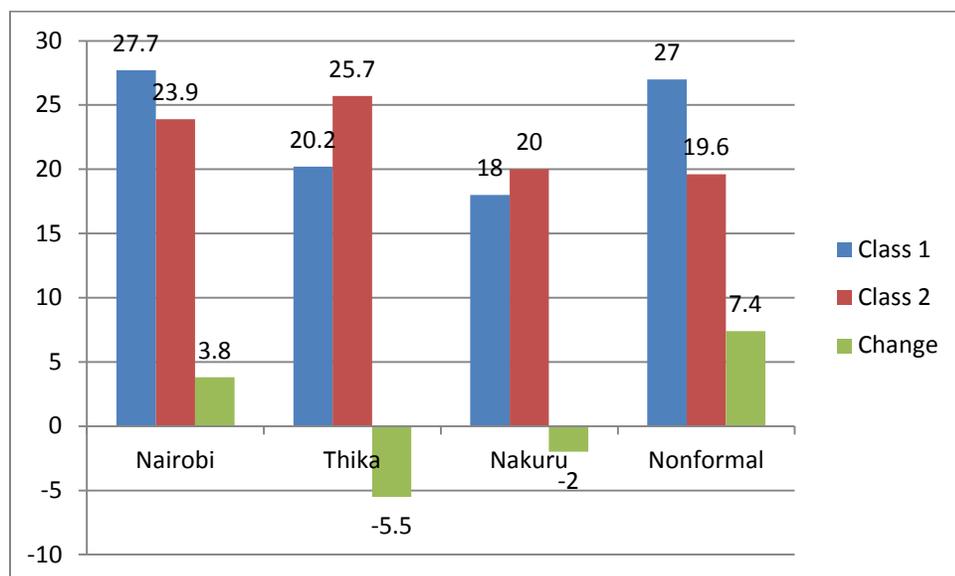


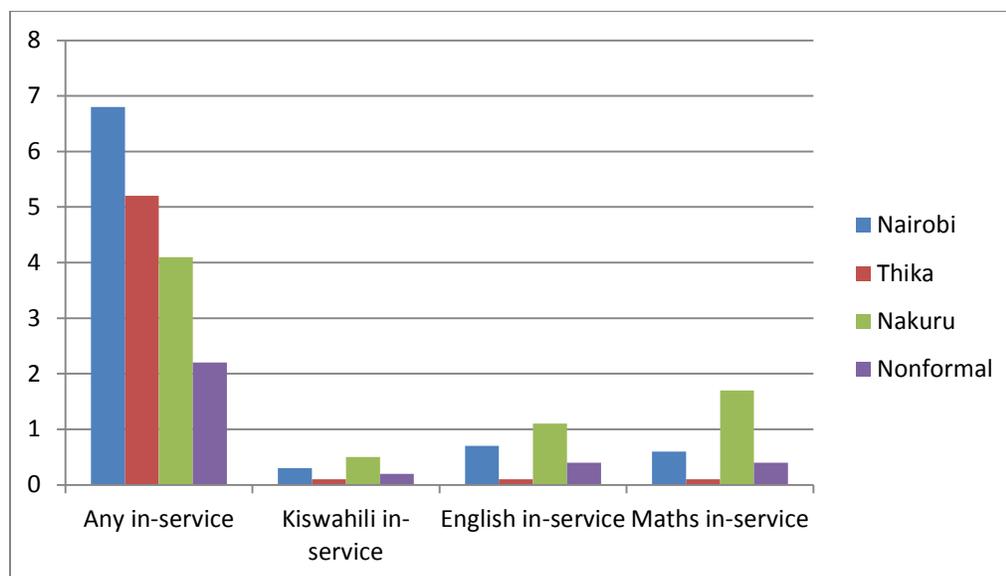
Figure 56 investigates the comprehension gap in a bit more depth. It presents the comprehension gap between Class 1 and Class 2, and shows the change in the gap over time. It shows the gap between what children could comprehend in listening and reading actually *increasing* in Thika and Nakuru. In other words, instruction in Class 1, in those areas, did not lessen the difficulties of accessing reading; instead, it expanded them. In Nairobi and nonformal Nairobi, on the other hand, Class 1 instruction lessened the gap between what pupils could comprehend by listening and what they could comprehend by reading.

Figure 56. Changes in comprehension gap over time, Classes 1 and 2



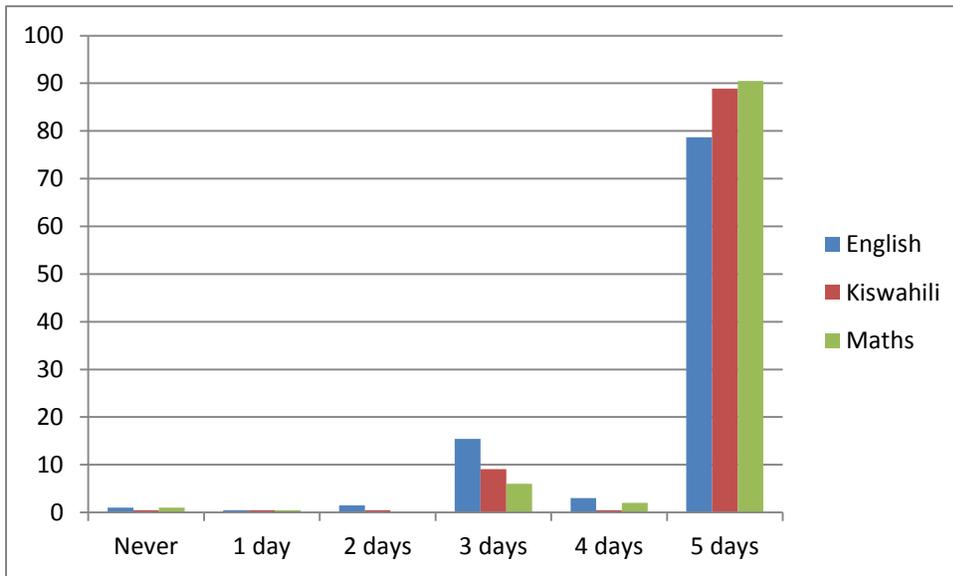
The PRIMR baseline study investigated the frequency of in-service training provided to teachers. We asked how many days of training they enjoyed over the past three years (Figure 57), and disaggregated that by subject, with specific interest in Kiswahili, English, and maths. The range by location was from 2 days in nonformal (less than 1 day per year) to nearly 7 days in Nairobi (less than 3 days per year). For the subjects, Kiswahili training was the least frequent, although English and maths training was still not frequent. It appears that the small amount of training that teachers receive is not specific to subjects, and therefore is less likely to impact pupil outcomes in these subject areas.

Figure 57. Number of days of teacher in-service training in past 3 years



The PRIMR baseline interview for teachers asked them how frequently the teachers used the textbook. While we showed above (Figure 45) that textbooks were in active use only 20% of the time, nearly 80% of teachers in all three subjects used the textbook on a daily basis (Figure 58). Interestingly, the next highest frequency was three days, particularly for English. This finding might stem from schools teaching only a few lessons in particular subjects per week.

Figure 58. Teachers' assessment of how frequently they use a textbook



We were able to investigate the schemes of work for English, Kiswahili, and maths. The status of those schemes of work is presented in Figure 59 through Figure 61. We found wide variation by location. More than 50% of schemes of work were missing in nonformal schools and Nakuru. In Thika and Nairobi, larger percentages of teachers were able to present the schemes. More worrying, only just over 20% of schemes of work in Nakuru were well done, or even less than the rate for nonformal schools.

Figure 59. Preparation of schemes of work in English

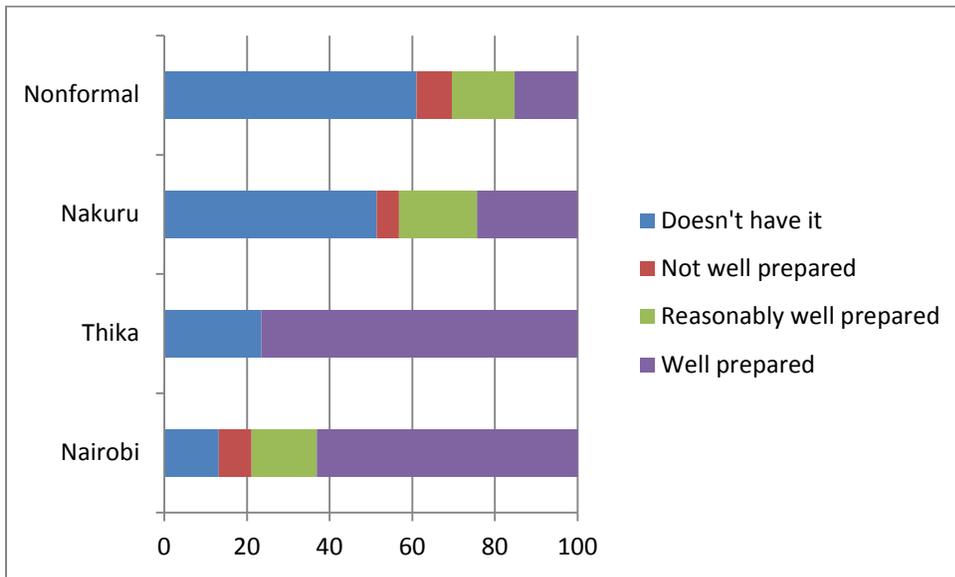


Figure 60. Preparation of schemes of work in Kiswahili

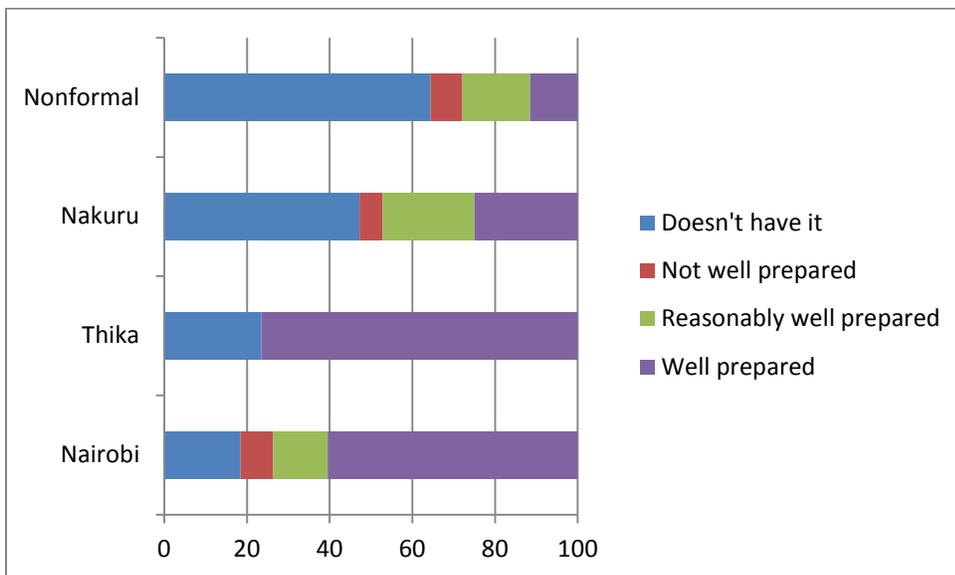
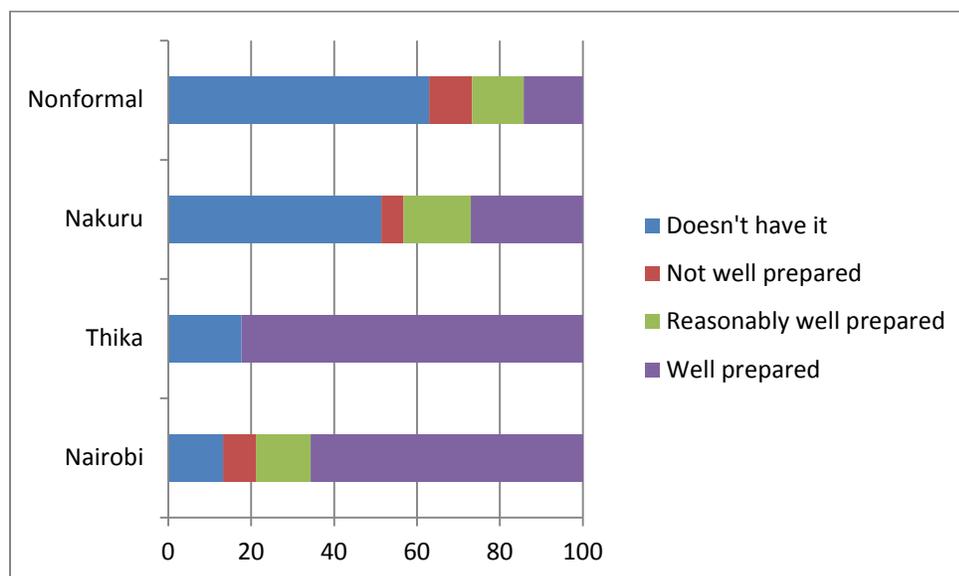


Figure 61. Preparation of schemes of work in maths



We were able to investigate by these data what proportion of lesson plans were well prepared (Figure 62). Interestingly, while children in Thika did much worse than in the other locations, their teachers' lesson plans were better prepared. Figure 63 through Figure 65 show that almost two thirds of lesson plans in the three subjects were judged well-prepared in Thika. The percentages were much lower in Nairobi and Thika, with less than 40% of lesson plans well-prepared in Nairobi and 25% in Nakuru. Less than 10% of lesson plans were well prepared in all three subjects in nonformal schools. The relationship between lesson plan preparedness and the outcomes of pupils is unclear, however, especially given the findings for Thika.

Figure 62. Overall proportion of lesson plans considered "well prepared"

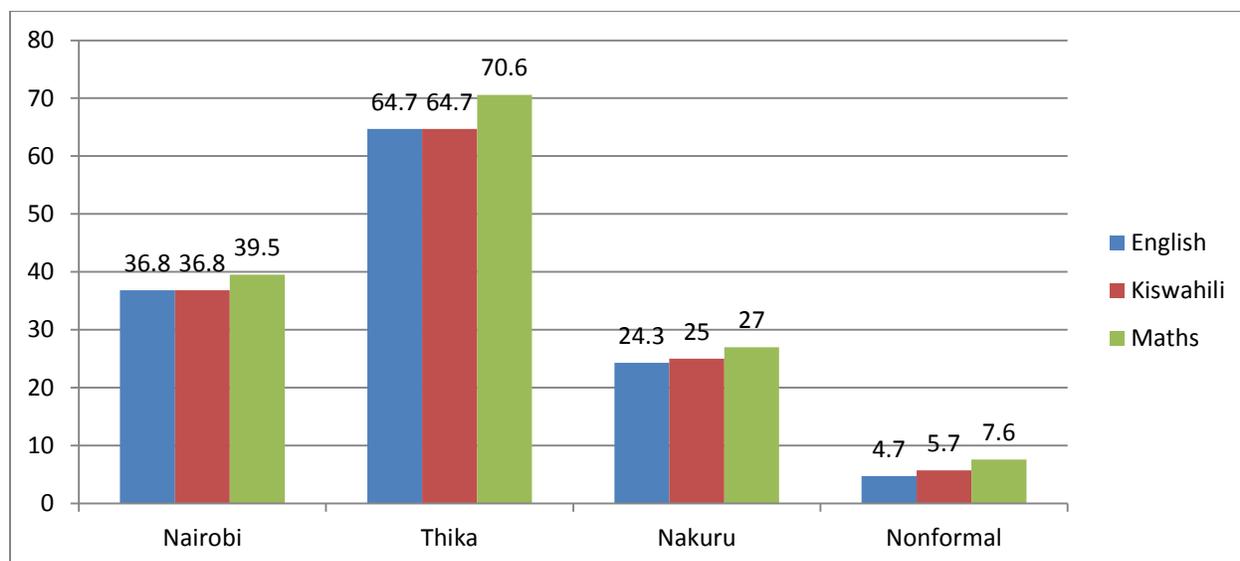


Figure 63. Status summary of lesson plans, English

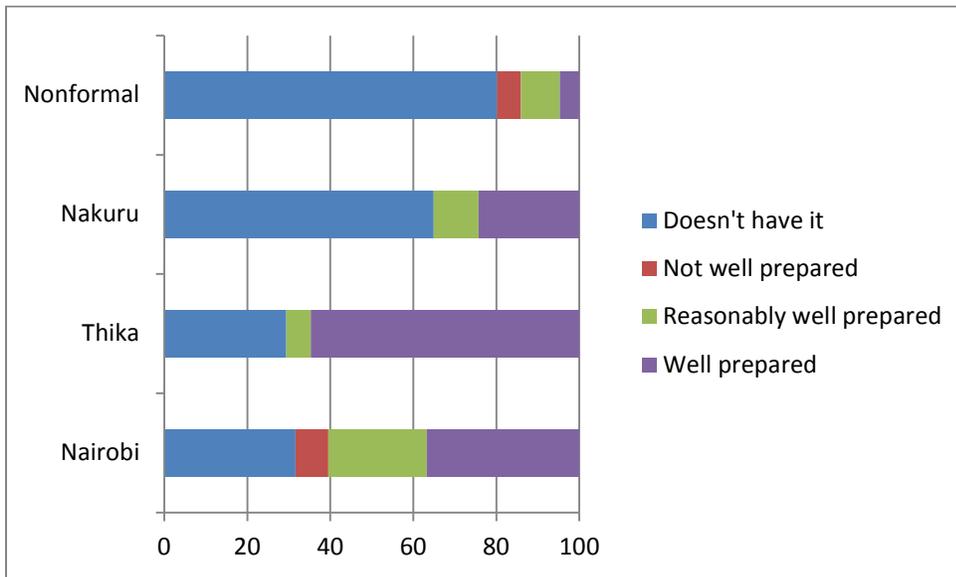


Figure 64. Status summary of lesson plans, Kiswahili

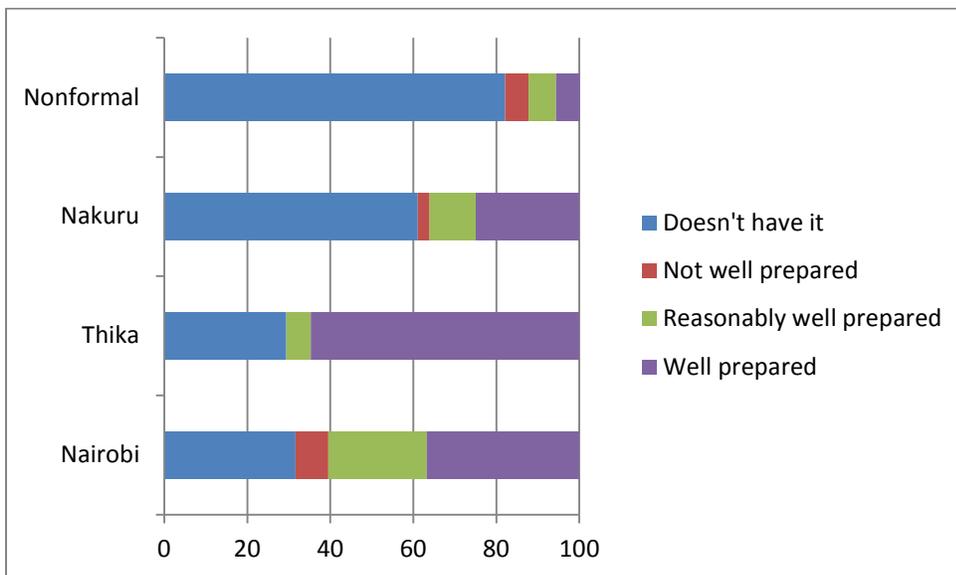
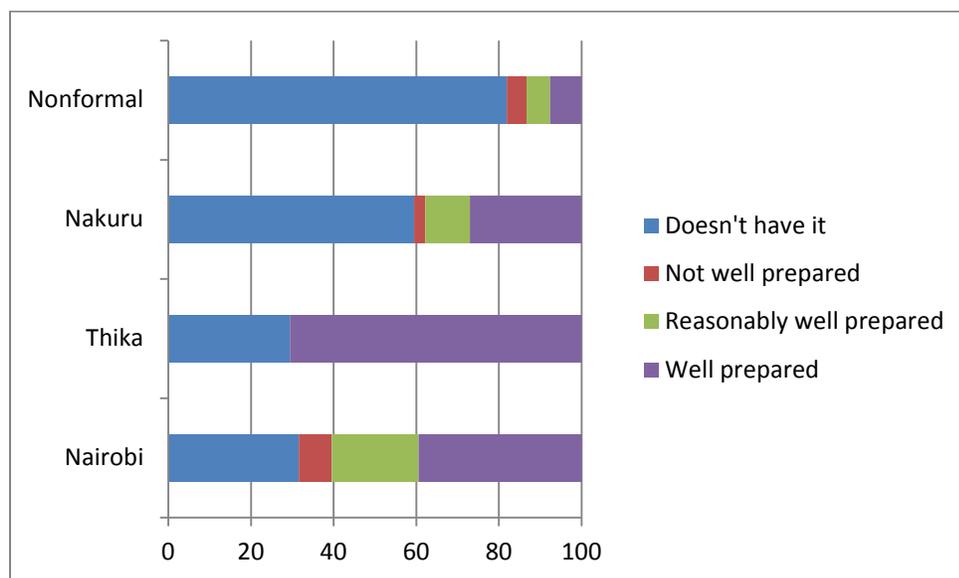
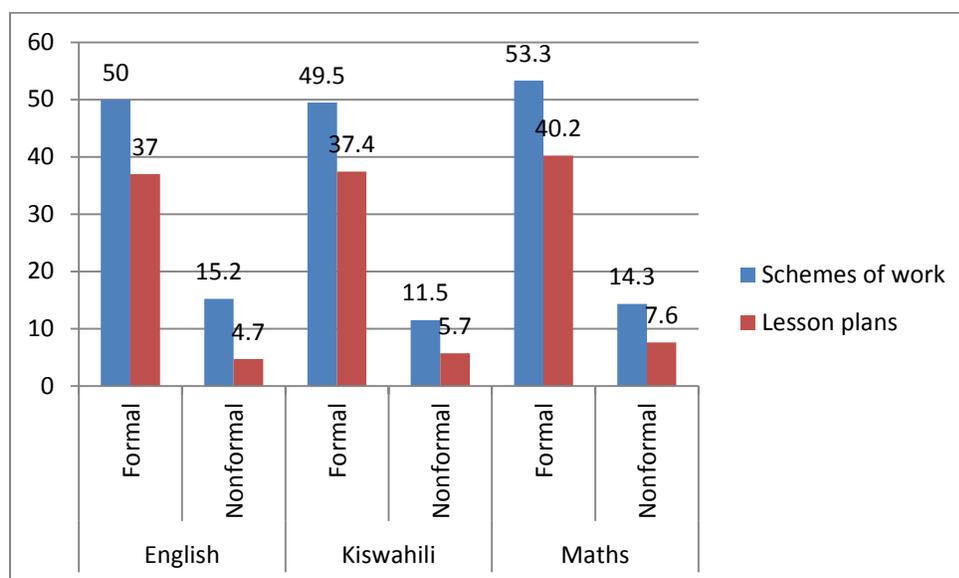


Figure 65. Status summary of lesson plans, maths



The rich SSME database that was part of the Kenya PRIMR baseline study allows us to investigate the relationship between schemes of work and lesson plans. In all of the comparisons, we found that greater proportions of schemes of work and lesson plans were well prepared in formal than nonformal schools, by approximately 30–40% (Figure 66). We also found that in all of the comparisons, across all subjects and in both formal and nonformal schools, schemes of work were more likely to be well-prepared than the lesson plans, usually by about 10% or more (but less for nonformal schools).

Figure 66. Proportion of schemes of work and lessons plans judged “well prepared”



Next we investigate the relationship between teacher qualifications and pupil outcomes in formal and nonformal educational institutions. Figure 67 presents average fluency rates for English by qualifications over formal and nonformal schools. Note that the differences between fluency rates by qualifications in formal schools are very small. The additional education provided to formal teachers with a bachelor's degree in education correlated with only 2.9 wpm more than having a P1 education. On the other hand, for nonformal teachers, the gap between the outcomes for teachers who were not qualified and those with a diploma was 14.2 wpm. It appears that the impact of training on pupil outcomes is much higher in nonformal schools than in formal schools.

Figure 67. Pupils' average reading fluency rates in English, by formal/nonformal and teacher's qualification level

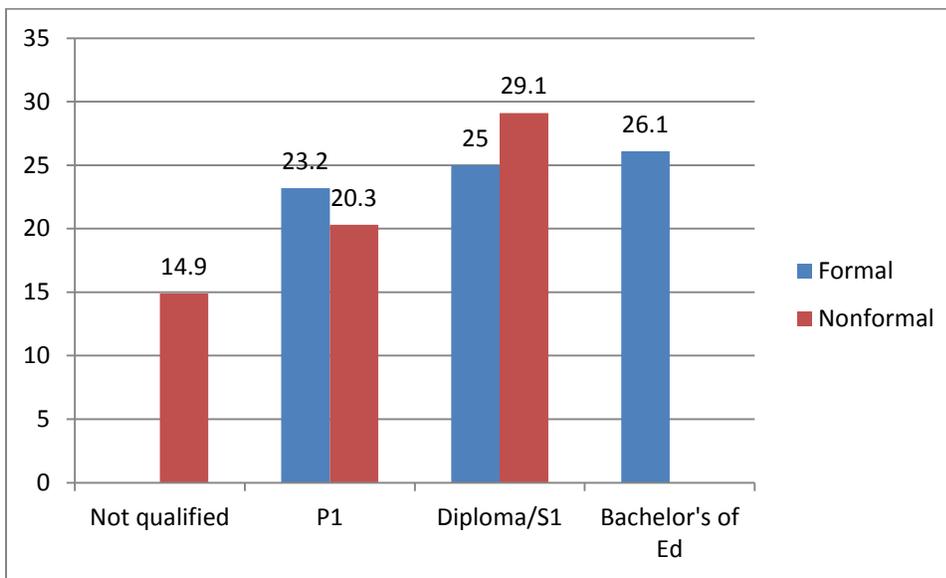
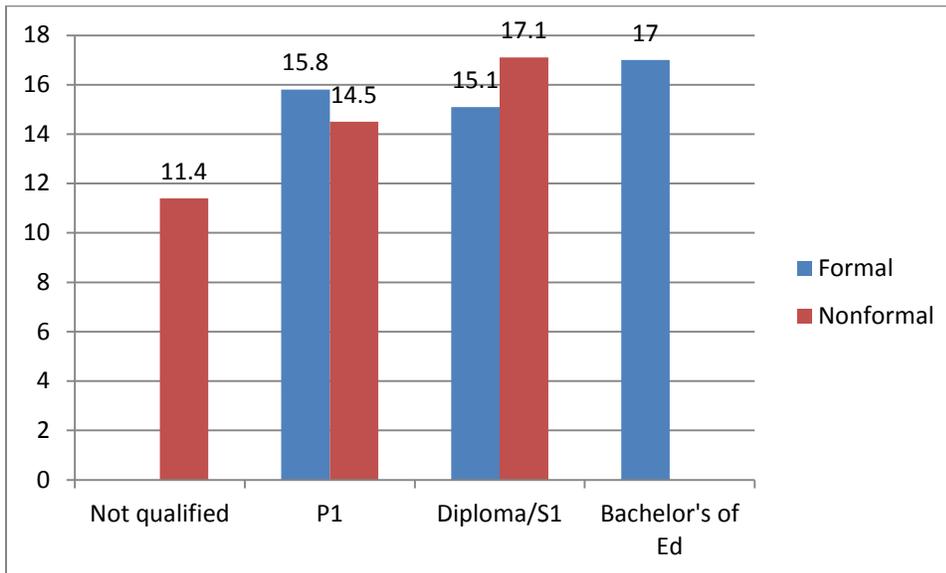


Figure 68 presents the pupils' reading fluency rates by formal and nonformal schools and qualifications for Kiswahili. We found that the relationship was very similar: That is, fluency rates were not very different among teachers in formal schools, regardless of qualifications. For formal schools, the gap between not qualified and diploma was 5.7 wpm. It is worth investigating more carefully why teachers in formal schools do not turn their skills into improved outcomes, while teachers in nonformal schools take whatever small training they receive and convert it into strong outcomes in reading improvement.

Figure 68. Pupils' average reading fluency rates in Kiswahili, by formal/nonformal and teacher's qualification level



5.4 Head Teacher Interview Results

We interviewed more than 210 head teachers (and a few deputy head teachers) during the January 2012 data collection period. We found that the largest proportion of them (37%) were not qualified in the approved manner, most of these being head teachers working in the nonformal schools (Figure 69). The other significant percentages were in P1 (23%) and diploma (21%).

Figure 69. Head teacher qualifications

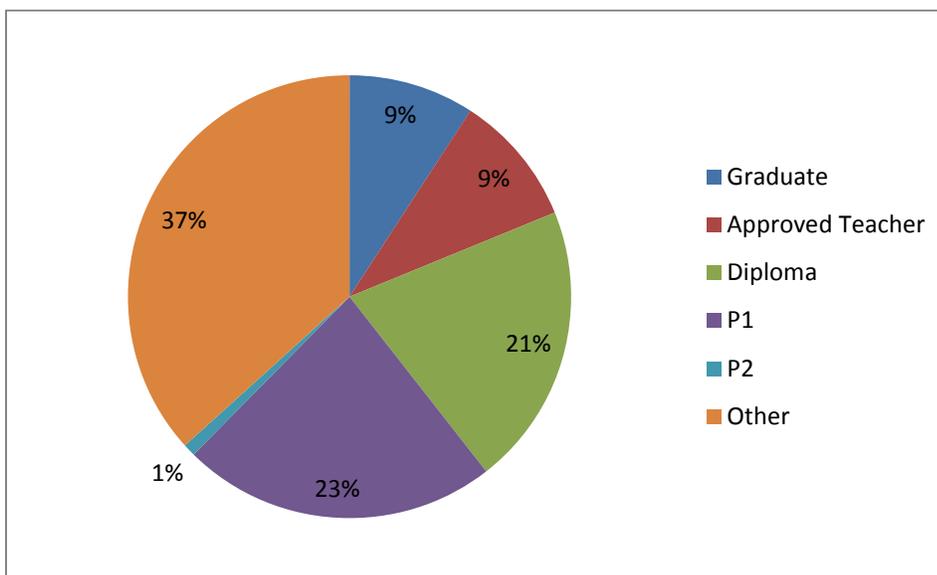
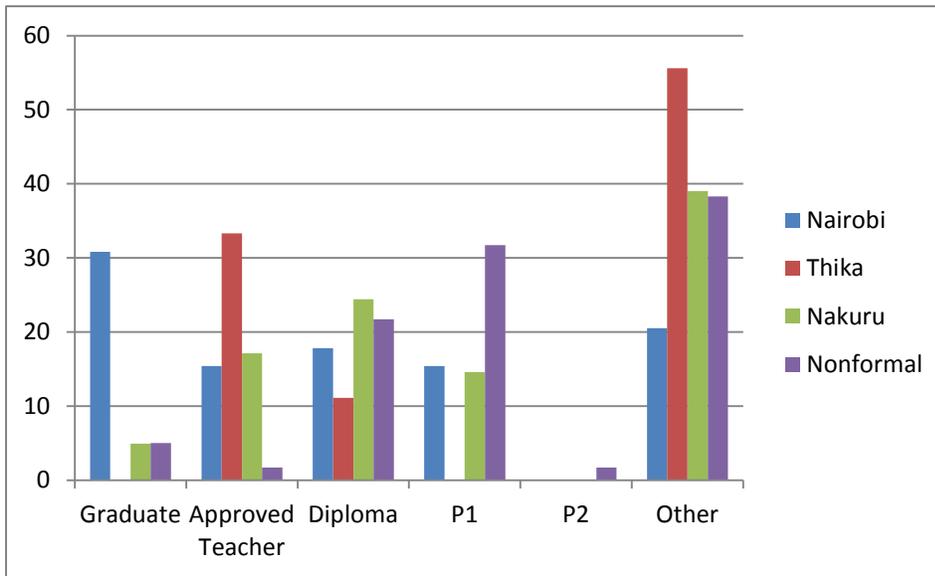


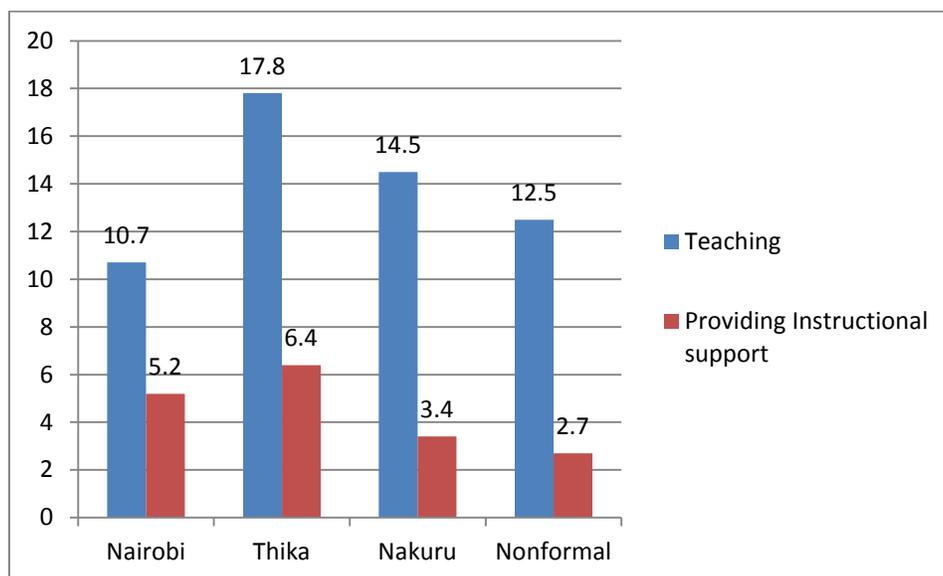
Figure 70 presents these head teacher qualifications by county. It shows that the highest percentages of graduate head teachers were in Nairobi, Thika had the highest amount of approved head teachers, Nakuru had the highest proportion of diploma head teachers, nonformal schools had the highest proportion of P1 head teachers, and Thika had the most (more than 50%) head teachers whose qualifications were “other.”

Figure 70. Head teacher qualifications, by county



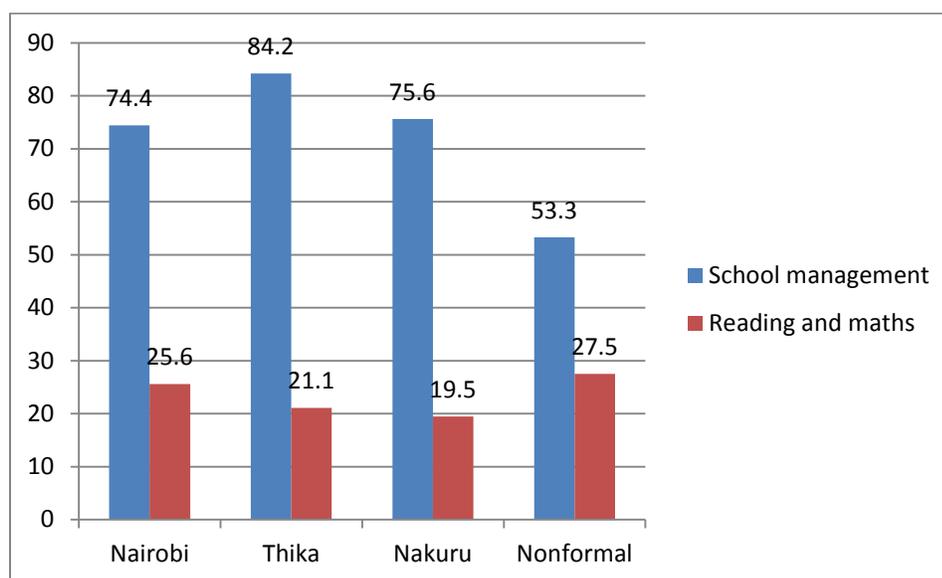
We investigated the frequency of time spent per week by head teachers in teaching and in providing instructional support. We found a consistent pattern for all four locations, in that much more time was spent teaching actual classrooms than supporting other teachers in their teaching. In fact, head teachers spent more than two times more time teaching than supporting other teachers, and the ratio was significantly higher in Thika, Nakuru, and nonformal schools. It is clear that the head teachers do not have sufficient time to focus on the quality of instruction, not only because of the common burden of administrative tasks, but also because of the extent of time that they themselves spend teaching individual classes.

Figure 71. Allocation of head teacher hours spent at school, per week



The head teachers were asked what training they had been provided in both school management and any reading and maths technical areas. Figure 72 presents their responses by location. It shows that three fourths or more of head teachers in Nairobi, Thika, and Nakuru were trained in school management. On the other hand, only 53.3% of nonformal head teachers had received training in school management. For reading and maths, we found that one fourth or less of head teachers in all three formal school locations had any training in reading and maths technical areas, with the lowest percentage in Nakuru. Interestingly, the highest percentage of teachers with reading and maths training was found in nonformal, at 27.5%. This limited training and likely, therefore, skills in these technical areas means that head teachers probably are not well equipped for a supervisory role in reading and maths improvement programs.

Figure 72. Head teachers' self-reports of training received



The head teacher survey also allowed us to ask head teachers whether they had been supporting teachers in their instruction of reading and maths. Although Figure 72 shows that few of them had training in those areas, 75% or more of teachers in all four locations said that they were supporting teachers in those areas (Figure 73). An interesting dichotomy was evident as head teachers were asked whether they were satisfied with the performance of teachers in those subject areas. We found that in Thika and Nakuru, the percentages satisfied with performance were 21.1% and 17.1%, respectively. These rates were more than twice as high in Nairobi (48.7%) and nonformal (52.1%). This location-specific difference suggests that head teachers are aware—at a basic level—of pupil performance. The strong correlation between EGRA outcomes and KCPE scores might give some idea of why the percentages are like this, as head teachers seem to have some idea of how well their children are performing, at least in a relative sense. More research is necessary to better understand the feedback mechanisms at work here.

Figure 73. Head teacher levels of support and satisfaction with teacher performance

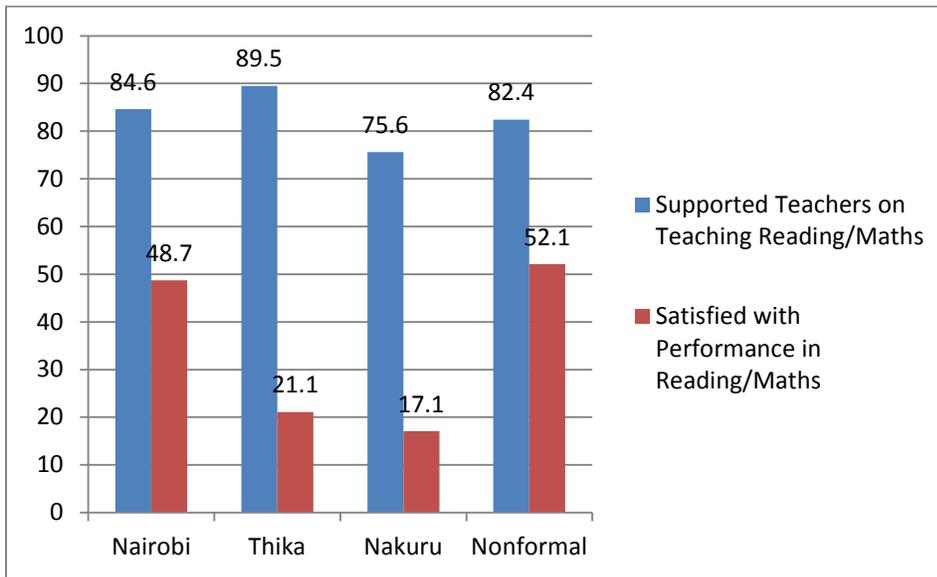
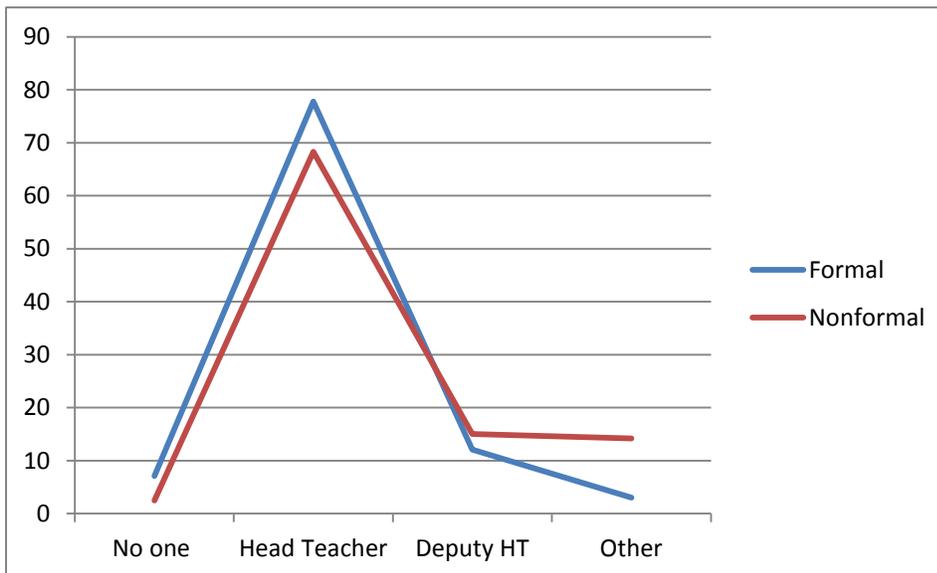


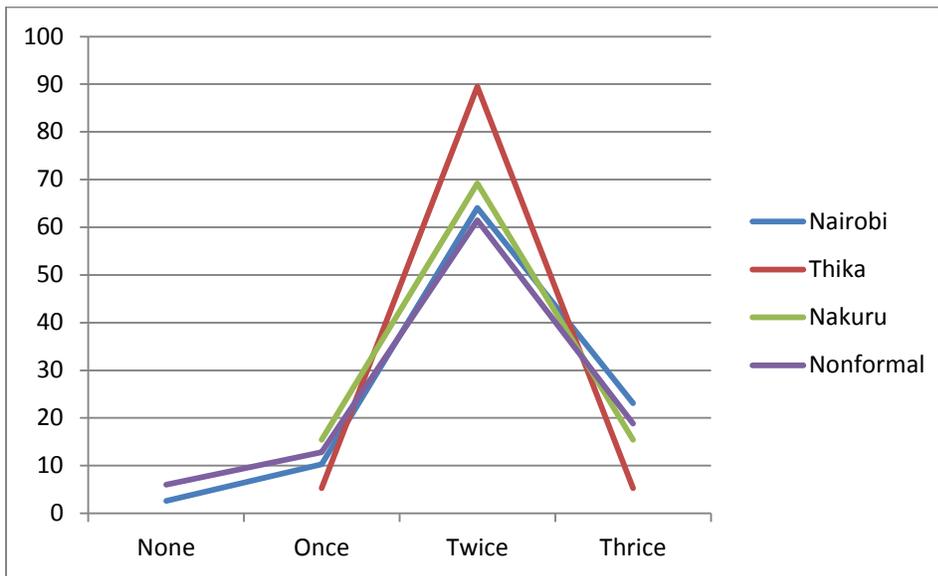
Figure 74 shows that lesson plan review was primarily the responsibility of the head teacher, with more than two thirds of head teachers in both formal and nonformal schools themselves being responsible for lesson plan review. The second most frequent response for both groups was that the deputy head teacher reviewed, although this percentage was dwarfed by the numbers for head teachers.

Figure 74. Responsibility for reviewing lesson plans



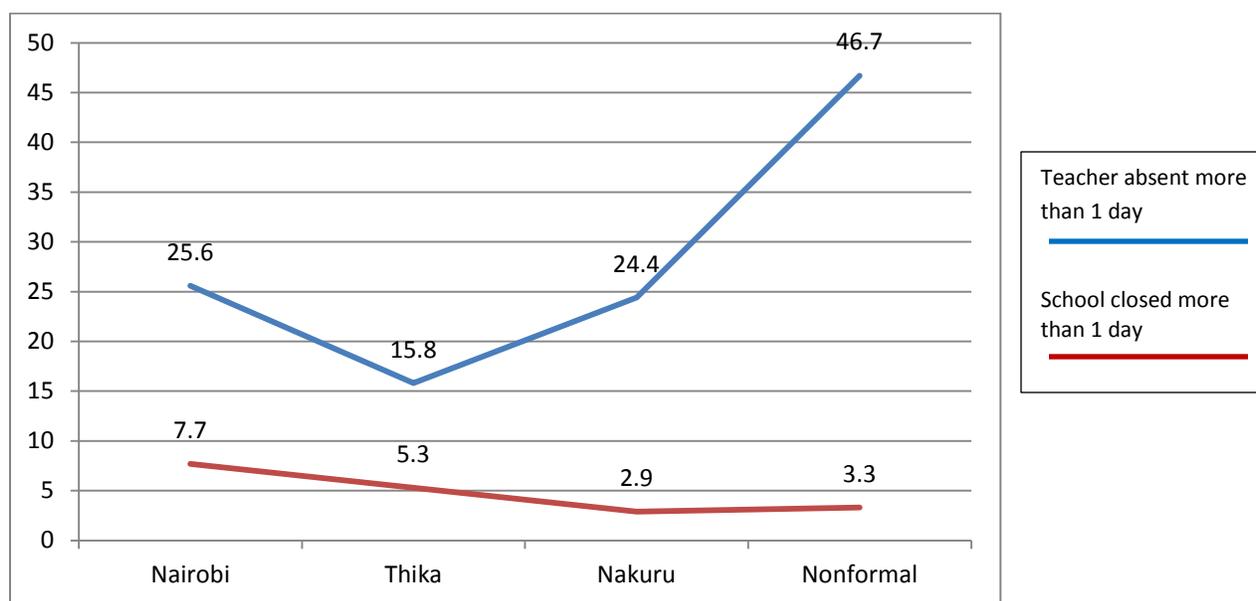
We were curious to know the relationship between the head teacher, the school, and the parent-teacher association (PTA) or school management committee (SMC). When asked how often the PTA or SMC met, the head teachers provided the data shown in Figure 75. In all four locations, the most common response, with over 60% of responses for each group, was twice per year, or once per term. Both the nonformal schools and the Nairobi samples included some that did not have any meetings at all, and Thika had the highest percentage of schools that met twice (and also the lowest percentage of those that met thrice or more). The consistency here is interesting, and the geographical consistency is also notable.

Figure 75. Frequency of PTA meetings in the past year



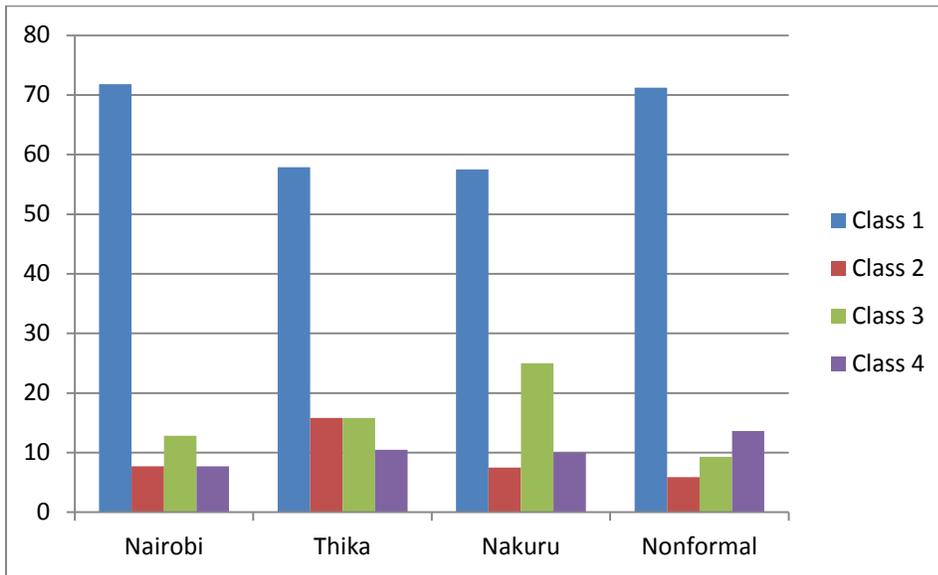
We asked head teachers whether they were absent for more than a day at some point during the academic year (Figure 76). Note that we both assessed pupils in early January and administered this interview item to the head teachers in January, at the very beginning of the school year. We also asked head teachers whether the school was closed for more than a day. Very few head teachers answered “yes” to the school-closure question, meaning that less than 10% of schools were closed more than expected. For the school-absence question, 25.6% of Nairobi head teachers and 46.7% of nonformal head teachers noted that they were frequently away from their post. The percentages were smallest in Thika (15.8%).

Figure 76. Rates of head teacher absence and school closures



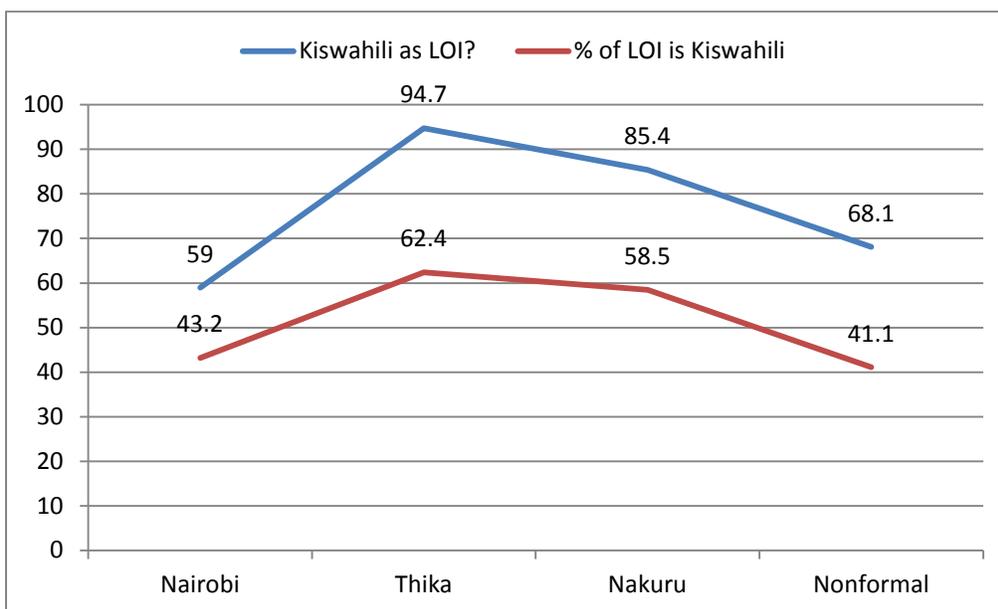
The baseline data provide a great deal of insight into the language-of-instruction question, particularly with respect to why teachers do not use more mother tongue or Kiswahili as the language of instruction. 77 shows the class level that the head teachers said they thought was “appropriate” for beginning to use English as the language of instruction. In all four locations, 12% or less of head teachers thought that Class 4 was appropriate, although this is the official class indicated by the policy. By far the most common year indicated was Class 1, with more than 50% of head teachers noting Class 1 in both Thika and Nakuru, and above 70% of teachers pointing to Class 1 in Nairobi and nonformal schools. It is therefore unsurprising that head teachers allowed the language of instruction used in classes to be English in the subject areas.

Figure 77. Teachers' opinions of appropriate timing for beginning to use English as language of instruction



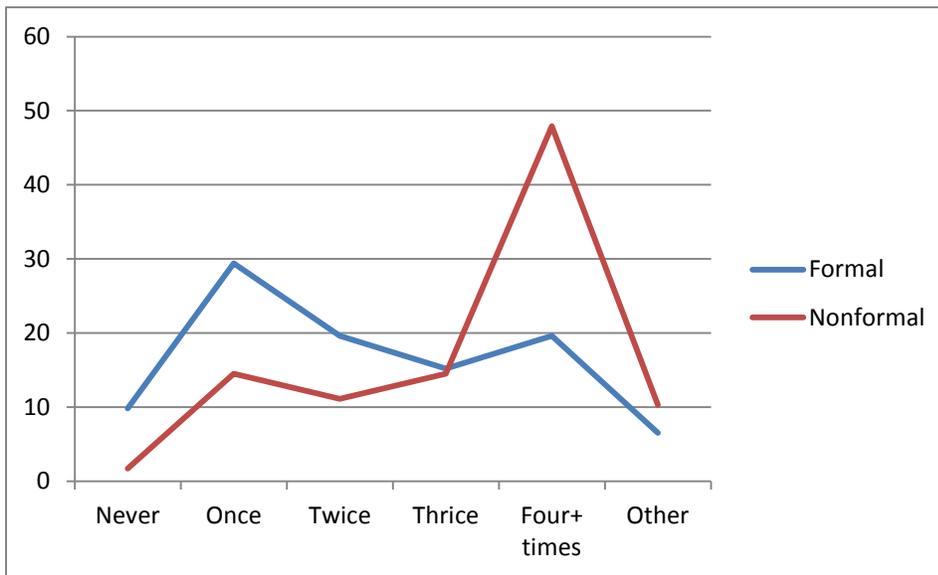
Following up on the topic of language of instruction and the relationship with head teachers' points of view, we present Figure 78. The blue line is the actual percentage of Kiswahili used as the language of instruction in subject areas, while the red bar is the head teachers' average estimates of how much Kiswahili was actually being used in schools. Head teachers underpredicted the percentage of Kiswahili used in classrooms by between 15.8% in Nairobi and 32.3% in Thika. The combination of negative attitudes to languages other than English and head teachers' general lack of knowledge of the actual language usage in schools creates an atmosphere of heavy dependence on English for language usage.

Figure 78. Comparison of head teachers' estimates of Kiswahili usage as LOI vs. observed usage



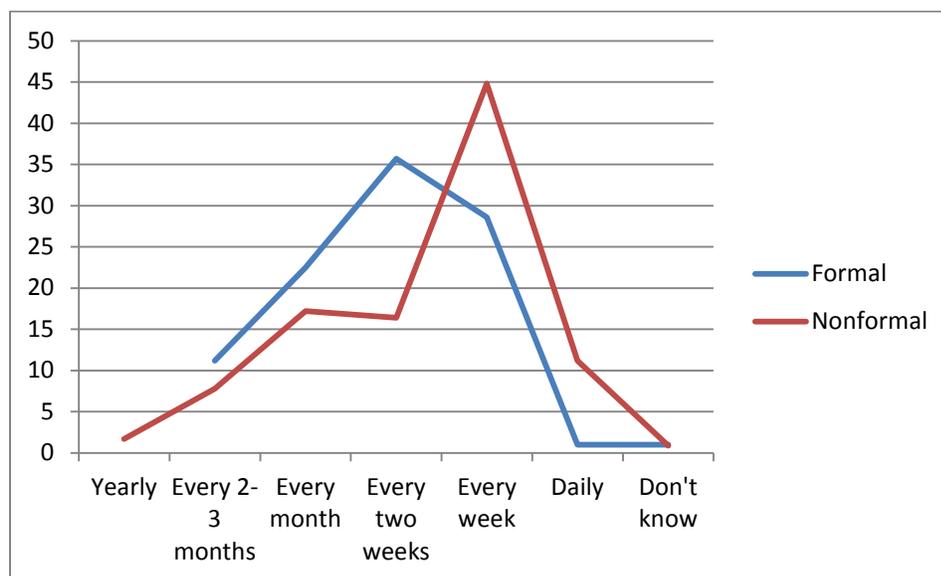
As a result of our interest in the relationship between head teacher management, instruction, and pupil outcomes, we present Figure 79, which indicates the proportion of head teachers who said that they visited classrooms, by frequency and by formal vs. nonformal. The most common response from head teachers was that they visited classrooms once a year in formal schools. Nonformal head teachers, however, said they visited classrooms four or more times. This frequency of classroom observation is very important for supporting instructional change in classrooms, and the fact that the nonformal schools are more likely to observe and support teachers makes it more likely that reforms undertaken in nonformal schools will be taken up by teachers in classrooms for the long term.

Figure 79. Frequency of classroom observations by head teachers



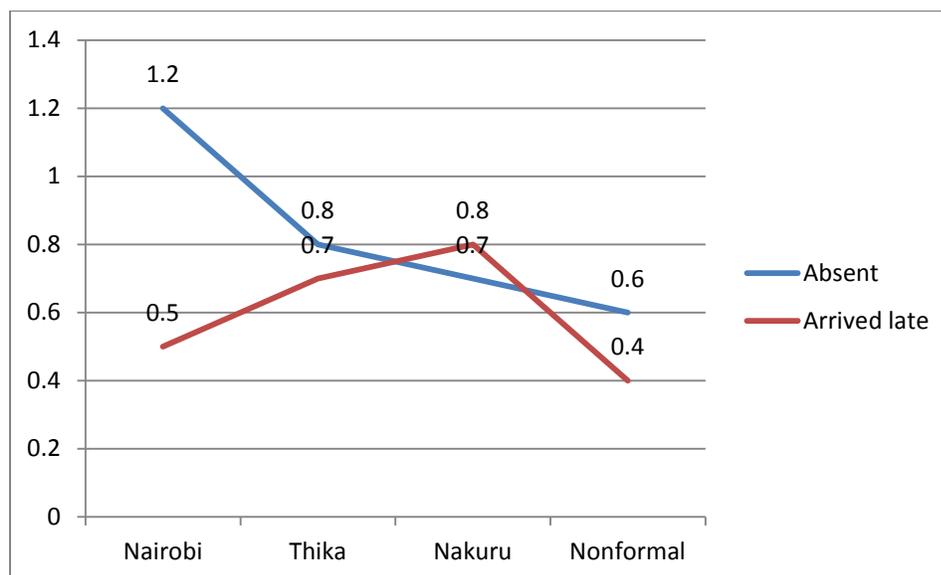
Following the discussion above, the PRIMR baseline also allowed us to investigate the frequency of lesson plan review by deputies, head teachers, and other pedagogical expert. We found that the most common frequency of lesson plan review in formal schools, in just over 35% of schools, was every two weeks (Figure 80). On the other hand, the most common frequency of lesson review in nonformal schools was every week. Combined with the other data presented above, it certainly appears that teachers in nonformal schools are under much more pressure to prepare for teaching and actually teach, although deciding they will prepare lesson plans and actually having the skills to do so are not the same. That said, this frequency analysis is revealing, and might explain some of the unexpected findings relating formal and nonformal schools.

Figure 80. Frequency of lesson plan reviews by various supervisors



Teacher absenteeism and lateness is a chronic issue in school management. Figure 81 presents the average number of teachers who were absent (blue) and late (red) on the observation day. The data show that, except for Nakuru, the number of teachers who were absent was higher than the number who arrived late. It also shows that the schools with the fewest numbers of teachers absent and late were nonformal schools. This might be an artefact of the relatively smaller numbers of teachers in the nonformal subsector. Overall, however, it is concerning that an average of nearly 1 teacher per school was absent and another 1 teacher arrived late. This situation will detract from time on task, certainly.

Figure 81. Average numbers of teachers absent or late on the day of assessment



6. Comparative Analyses

6.1 Predictive Analyses

The complexity of the PRIMR EGRA, EGMA, and SSME data set makes it possible to estimate the relationship between pupil, teacher, classroom, and school outcomes against pupil outcomes on Kiswahili, English, and maths assessments. The figures below present the statistically significant predictors against all three subjects. The predictors are arranged by magnitude of relationship with Kiswahili oral reading fluency (Figure 82), English oral reading fluency (Figure 83), and addition fluency (Figure 84). The colours on each figure relate to the relative power of the teacher and school to affect the predictor. Blue bars are pupil and school predictors that are, for the most part, out of the control of the school system. The red bars are the system-issues predictors that could be affected by the school and/or school system. The yellow bars are those that are completely in the control of the school, and more specifically the teachers and their teaching strategies.

For Kiswahili, Figure 82 shows that the predictors with the highest parameter estimates on Kiswahili oral reading fluency are all out of the policy reach of the school and the teacher. Several others of interest have very little impact, specifically days of in-service training on Kiswahili during the past three years (0.0 wpm). Apparently, teacher training that is not related to improving reading outcomes will not improve outcomes. Classroom enrolment also was not predictive, which means that teachers who teach well can do so even in large class sizes. Several red bars show areas that could be affected—namely, maths book-pupil ratio (4.5 wpm), school having a feeding program (4.5 wpm), speaking the same language at home as in school (4.2 wpm), English book-pupil ratio (4.0 wpm), having a school library (3.9 wpm), the pupil having an English textbook (3.5 wpm), and the pupil having a Kiswahili textbook (2.8 wpm). Access to reading materials is clearly a critical step for Kenya to emphasize in the short and medium term. Similarly, we found several areas highly predictive of pupil outcomes, particularly using written assessments to measure reading progress (3.8 wpm), having reading material at home (3.9 wpm), and being able to evaluate whether the teacher is satisfied with reading and maths performance (4.4 wpm). There appear to be quite a few practical steps for teachers and head teachers to improve reading outcomes.

Figure 82. Significant predictors for pupil outcomes on Kiswahili EGRA

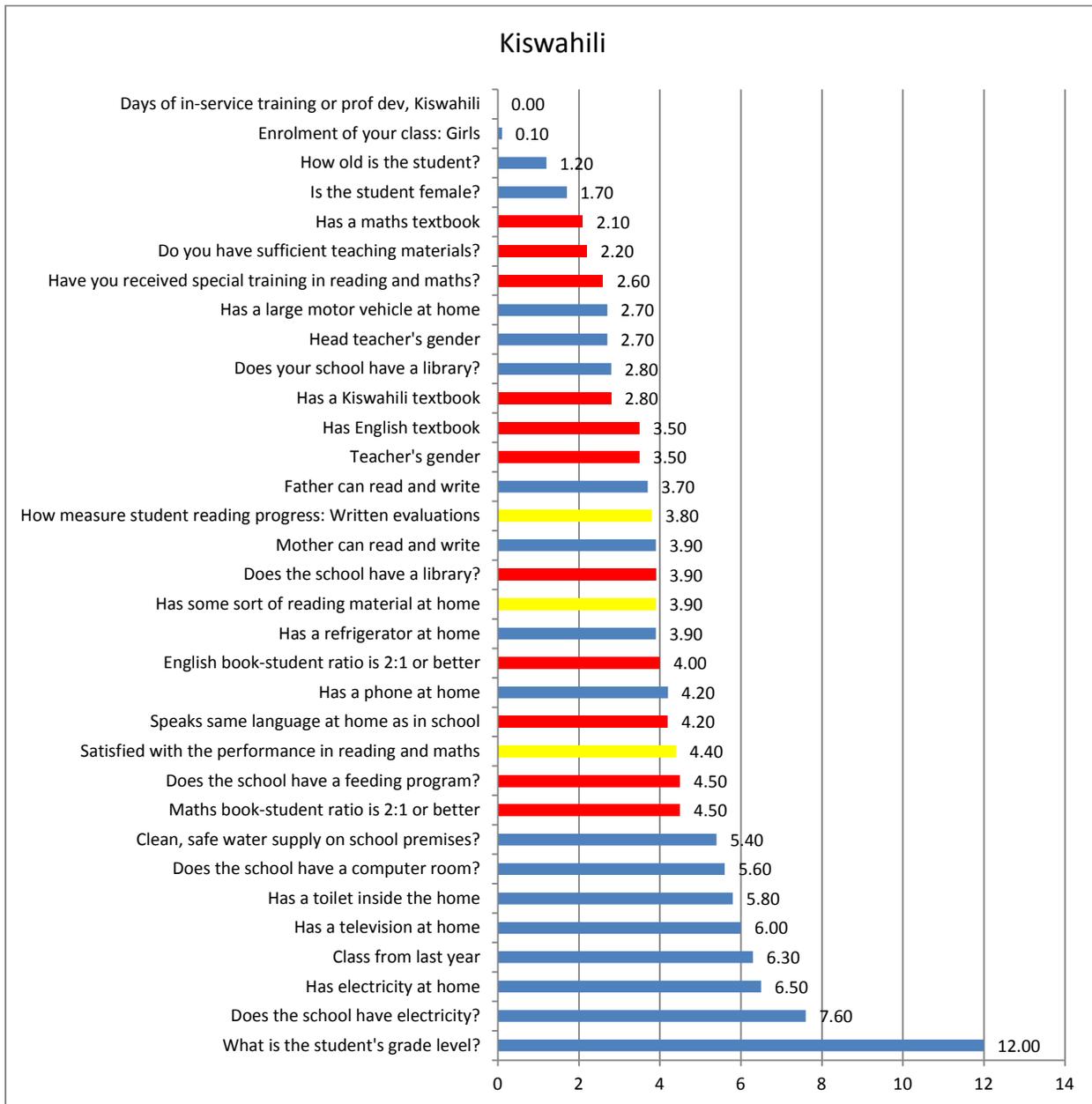
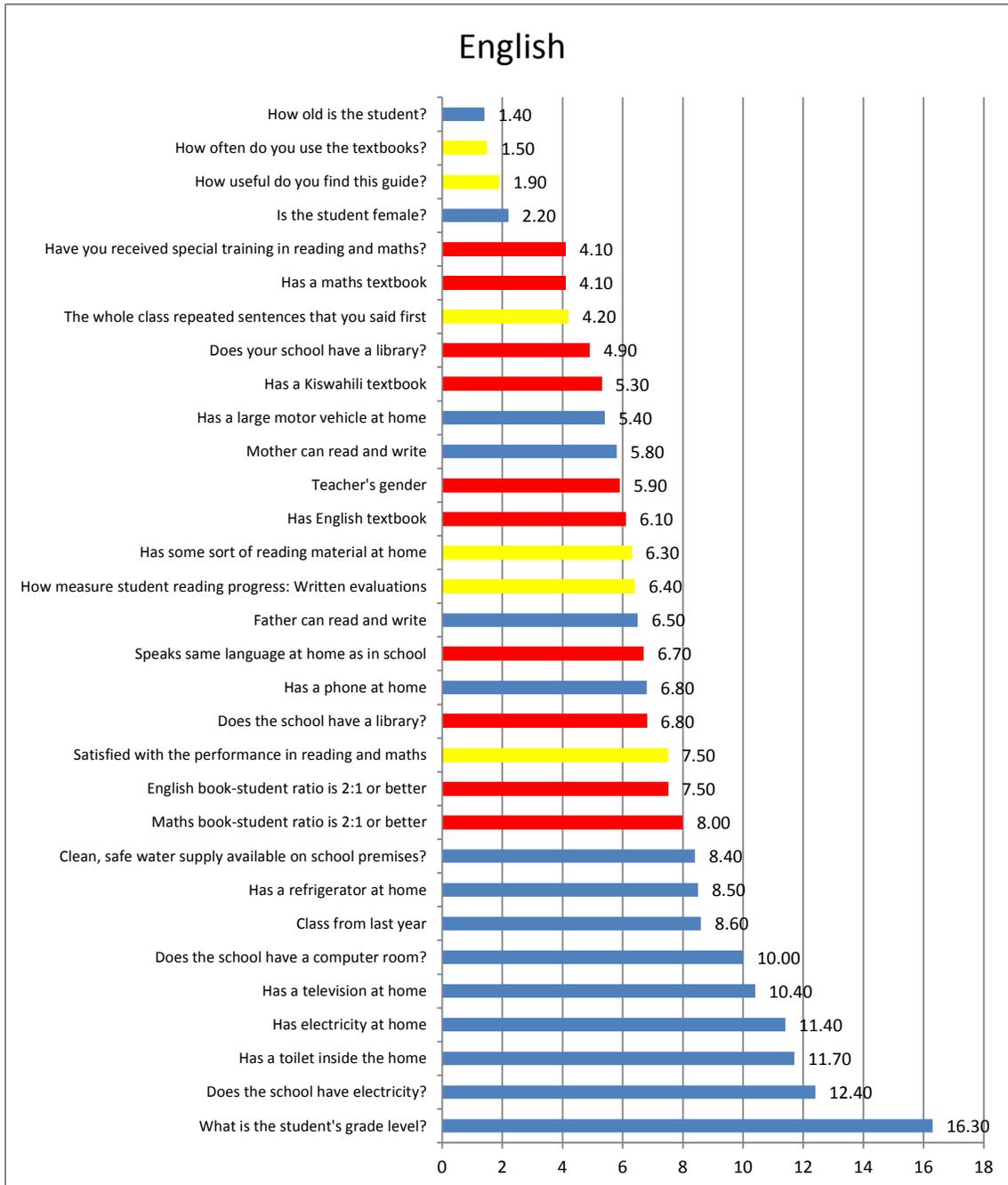


Figure 83 presents the magnitude of the predictive relationships between various predictors and English oral reading fluency. Unsurprisingly, as English outcomes had more variability than did Kiswahili, the magnitude of these relationships is generally larger. All of the very largest relationships were with predictors that are out of the substantive control of either the school system or the school. Some areas with potential for policy and systems support are the English book-pupil ratio (7.5 wpm), the maths book-pupil ratio (8.0 wpm), and having a school library (6.8 wpm). Having the ability to be taught in the same language at home as in school (6.7 wpm) mattered, as did having an English textbook (6.1 wpm), having a female teacher (5.9 wpm),

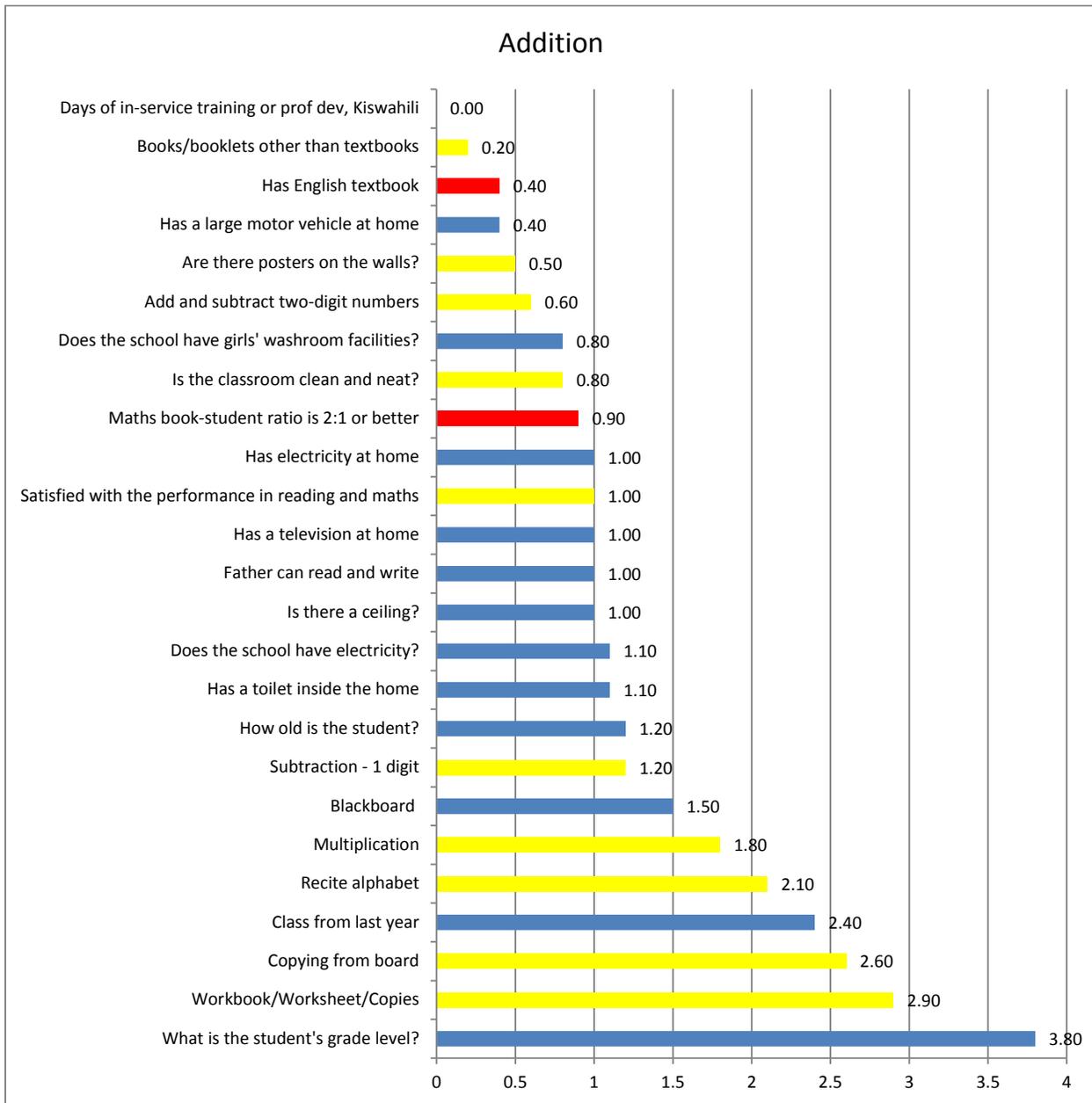
having a Kiswahili textbook (5.3 wpm), and teachers having some training in reading and maths instruction (4.1 wpm). Instructional matters were important as well, such as investigating the performance of children (7.5 wpm), measuring pupil reading progress using written assessments (6.4 wpm), and pupils having reading materials at home (6.3 wpm). Combined with instructional strategies at the sentence level (4.2 wpm), using textbooks frequently (1.5 wpm), and finding the guide useful (1.9 wpm), some basic focused policy and instructional strategies could be used to quickly improve reading outcomes in English.

Figure 83. Significant predictors for pupil outcomes on English EGRA



The maths findings are a bit different (Figure 84). Far fewer predictors are within the school systems' control: only having an English textbook (0.4 addition problems per minute [apm]) and having a low maths book-pupil ratio (0.8 apm). At the classroom instructional level, quite a few things mattered, including having books other than textbooks (0.2 apm), having posters on the walls (0.5 apm), spending time with two-digit addition and subtraction (0.6 apm), having a neat and clean classroom (0.8 apm), being interested in reading and maths performance (1.0 apm), and other instructional skills. These included doing one-digit subtraction (1.2 apm), practicing multiplication (1.8 apm), reciting the alphabet (interestingly; 2.1 apm), copying from the board (2.6 apm), and giving workshops and workbook work (2.9 apm). Although the copying from board item is surprising, these findings amount to strong evidence that addition fluency can be improved with instructional more than institutional efforts.

Figure 84. Significant predictors for pupil outcomes on addition fluency



6.2 Reading Fluency vs. Other Outcomes

This portion of the baseline report focuses on the relationships between the fluency outcomes and other outcomes of interest. Figure 85 presents the mean fluency rates in Kiswahili (as school averages) on the x-axis and the mean fluency rates in English (also as school averages) on the y-axis. The figure shows a very strong relationship between Kiswahili and English fluency, indicated by the tight clustering of the dots to an imaginary line through them. Note that the problem is that far too many schools are clustered at less than 10 wpm for both Kiswahili and English. The numbers next to the dots indicate their locations: 1s for Nairobi, 2s for Thika, 3s for Nakuru, and 4s for nonformal. The schools that had the highest averages for both languages were

predominantly from nonformal and Nairobi, although one school in Nakuru had high average fluency rates. Figure 85 tells us that where reading is taught, children can learn it in both languages, and that the areas with strong reading skills are primarily in Nairobi's formal and nonformal sectors.

Figure 85. Mean fluency rates in Kiswahili vs. English (school averages)

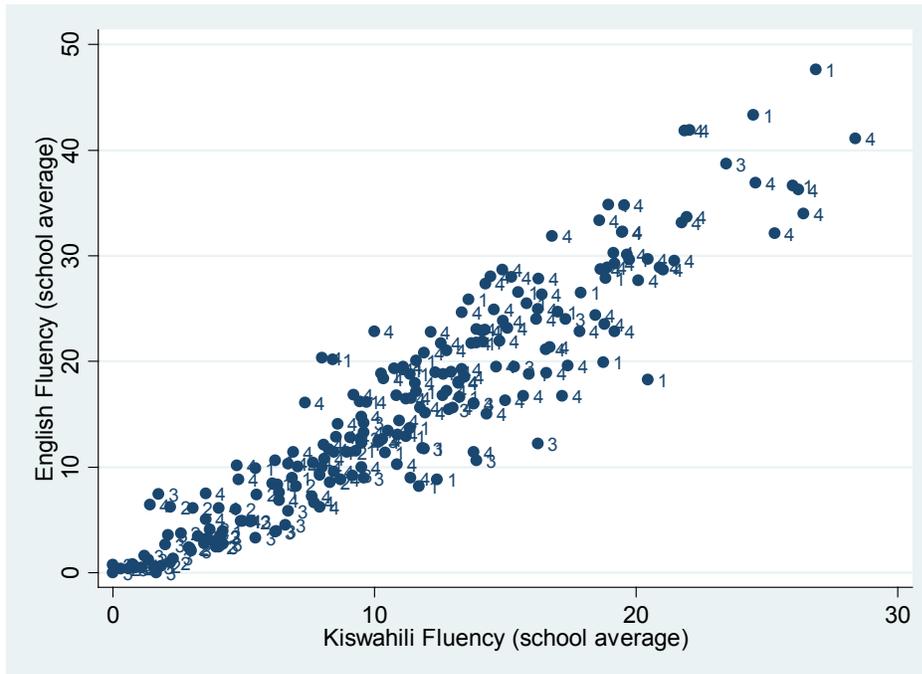


Figure 86 and Figure 87 show scatterplots between the 2011 mean KCPE score and the average English and Kiswahili fluency scores. While the regression model does not explain all of the variation in English and Kiswahili fluency by the mean score on KCPE, the relationship is quite strong. It shows that where KCPE scores were high, EGRA and EGMA fluency rates also were high. This was true even before the PRIMR reading and maths interventions. Schools that were strong in Class 7 and 8 were also strong in Classes 1 and 2. It is also interesting that the predictive power of English was higher than that of Kiswahili on the KCPE. This is evident in two ways: First, the clustering of dots around the line is closer; and second, the R^2 is higher for the English scatterplot (.37) than for the Kiswahili one (.26).

Figure 86. Scatterplot of 2011 mean KCPE vs. average English fluency scores

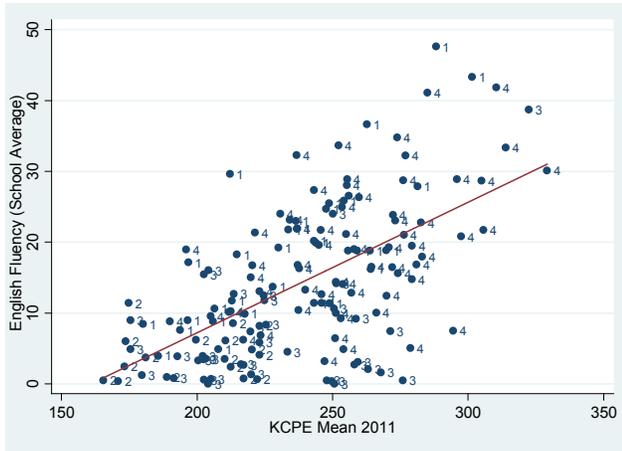
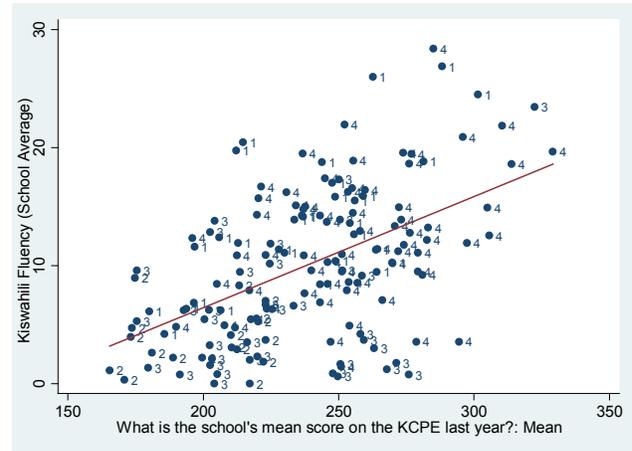


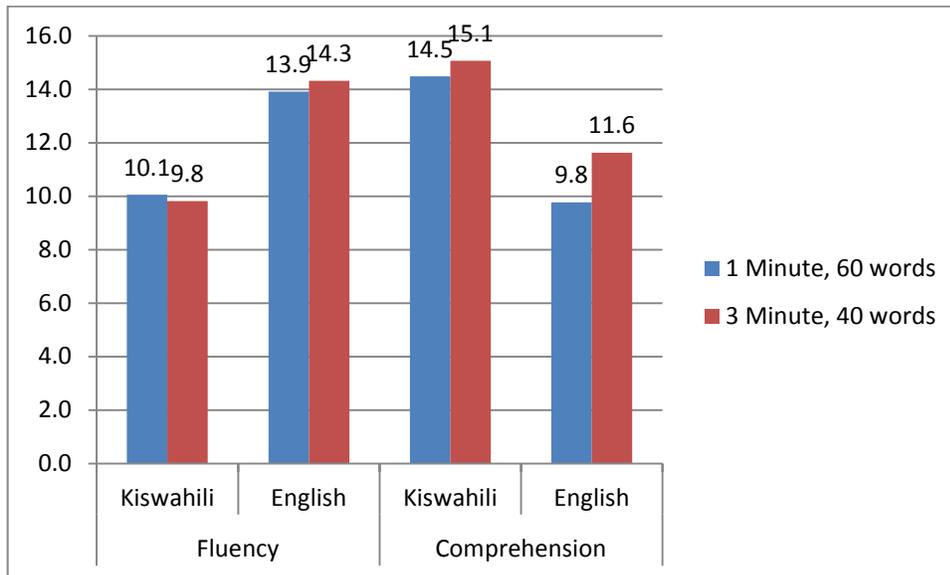
Figure 87. Scatterplot of 2011 mean KCPE vs. average Kiswahili fluency scores



EGRA studies in many countries have examined the relationship between oral reading fluency and comprehension. For those studies, we have presented comprehension scores on both the total number of comprehension questions and the number of comprehension questions attempted because we have been unsure how children would do on comprehension subtasks that were not tied to the reading fluency passages. Therefore, for the PRIMR baseline and SSME assessment, we gave children two stories in English and two in Kiswahili in order to estimate whether and how fluency and comprehension would interact within and across passages. This section presents those findings. First, Figure 88 shows the fluency rates (wpm) on both a timed and an untimed passage. The untimed passage was not purely untimed, but as children were given 3 minutes to read a passage only 40 words long, it was for all intents and purposes untimed, and for 97% of the sample, they were never pushed to hurry their reading. The bars on the left show no substantive difference in fluency rates between Kiswahili timed (10.1 wpm) and untimed (9.8 wpm) outcomes. For English, the story was the same: no difference in fluency rates between timed (13.9 wpm) and untimed (14.3 wpm) scores. In short, this shows that in Kenya, a pupil who could not read in the first minute could not read at all.

Even comprehension scores were the same for Kiswahili (14.5% timed, 15.1% untimed), and revealed only minute differences—less than 2%—for English (9.8% timed, 11.6% untimed). This shows that children were not using a different processing structure than the literature expected, and instead, if children were to comprehend, they had to read at a sufficient rate to process the written information.

Figure 88. Reading fluency and comprehension results



This idea is brought into stark relief by the scatterplots presented below. Figure 89 shows the untimed Kiswahili fluency rates for individual children on the *x*-axis and timed fluency rates for the same children on the *y*-axis. As found in some of the other fluency comparisons across and within languages, the predictive power of one rate is very high for the other rate. However, in this scatterplot, several children read much slower in the untimed fluency passage than they did on the timed fluency passage. This suggests that, instead of speeding up their fluency rates given more time, children actually slowed down. The relationships between fluency in English on the timed and untimed passages (Figure 90) are less clustered on the regression line than they are for Kiswahili, and some children read slower in the timed than untimed passage, but just as many were plotted in the other direction. It might be that the larger variation in English oral reading fluency rates allows for a wider range of relationships.

Figure 89. Kiswahili oral reading fluency rates, timed vs. untimed

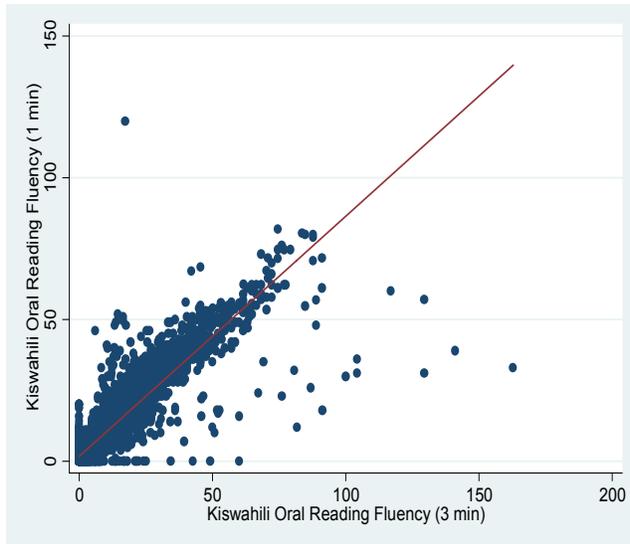
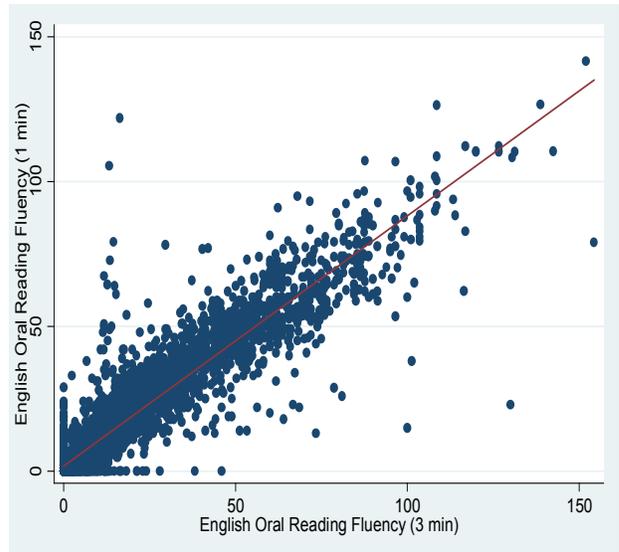


Figure 90. English oral reading fluency rates, timed vs. untimed



PRIMR’s greatest interest is in the relationship between fluency and comprehension. What we are looking for is whether the relationship is of the same predictive power or not, when the comparison between fluency and comprehension is linked to the same passage or not. On the *x*-axis of both Figure 91 and Figure 92, fluency rates are presented. On the *y*-axis of Figure 91, we present the reading comprehension scores for the one-minute *timed* passage, and in Figure 92, we present the *untimed* reading comprehension scores. Given that the untimed passage was not linked to the timed passage, it is logical that the link would not be as tight, nor the predictive power as strong (R^2 of .77 compared to .55), which is exactly what Figure 91 and Figure 92 show.

Figure 91. Kiswahili timed reading comprehension vs. fluency scores

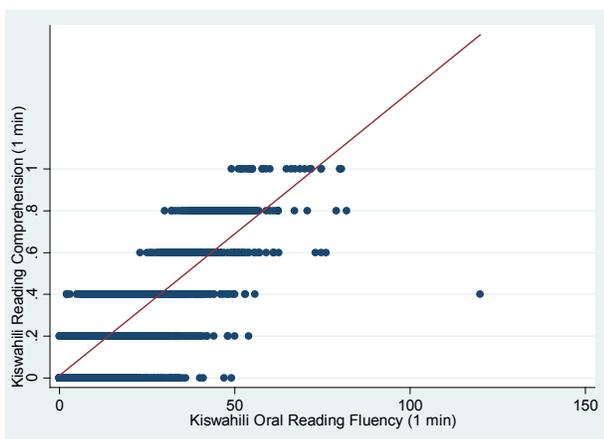
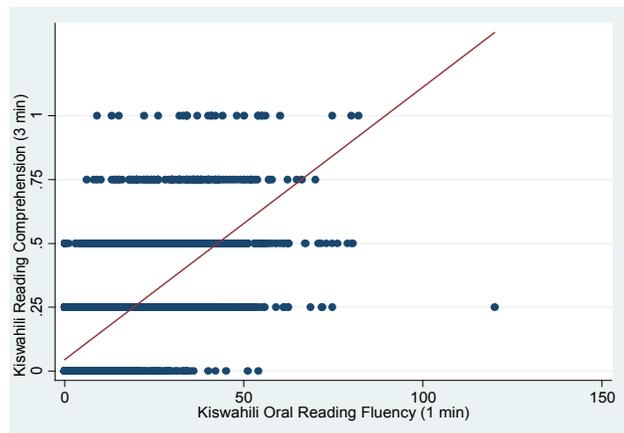


Figure 92. Kiswahili untimed reading comprehension vs. fluency scores



The relationships were generally the same for English (Figure 93 and Figure 94); the predictive power was slightly higher for the timed than the untimed questions (R^2 of .62 compared to .55). The main difference with respect to predictive power was the lower R^2 for the English timed fluency and timed comprehension, which simply suggests more variation in comprehension scores in English, as children came with a wider range of background skills in English than in Kiswahili.

Figure 93. English timed reading comprehension vs. fluency scores

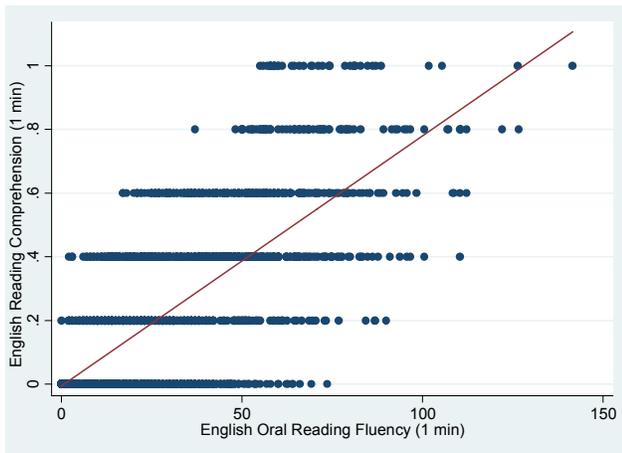


Figure 94. English untimed reading comprehension vs. fluency scores

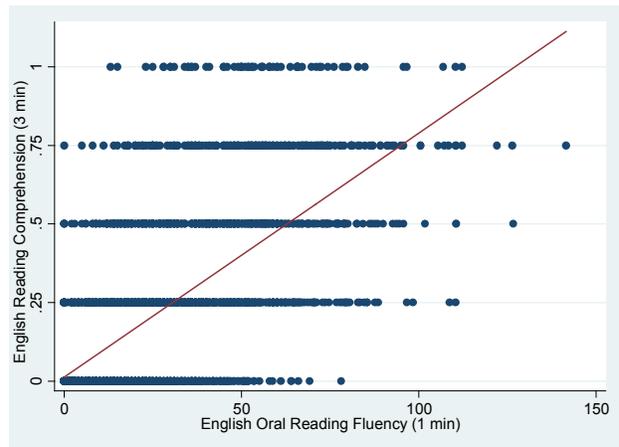


Figure 95 and Figure 96 represent the distribution of oral reading fluency in Kiswahili and English by Class 1 and 2. Unsurprisingly, given that the assessment was given at the very beginning of the year, the vast majority of Class 1 pupils did not read any words in the allotted time: more than 70% for English and more than 80% for Kiswahili. Very, very few children read more than 50 words per minute in either language in Class 1. In Class 2, the number of zero scores was close to 40%, with slightly more in Kiswahili than in English. In English Class 2 there were a handful of children who read more than 100 words per minute, but the vast majority were less than 50 wpm; far fewer read more than 50 wpm in Kiswahili than in English. These histograms support what the report discusses above: the quite dismal outcomes by children in Kenya in reading fluency at the beginning of Class 2.

Figure 95. Kiswahili oral reading fluency results, Classes 1 and 2

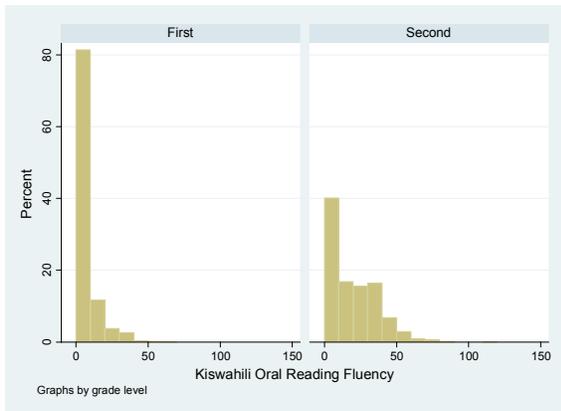


Figure 96. English oral reading fluency results, Classes 1 and 2

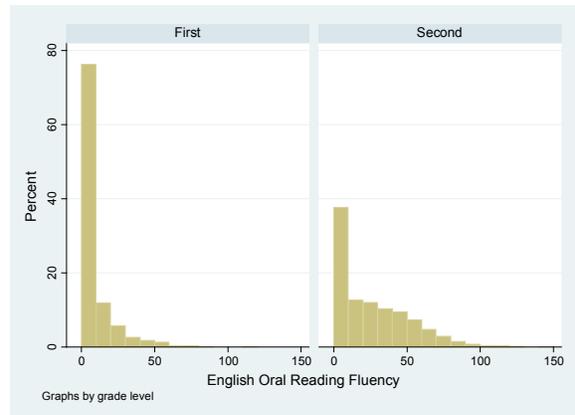


Figure 97 and Figure 98 present the fluency rates of children on both the timed and untimed subtasks and for both Kiswahili and English. The fluency rates were broken down into groups, depending on how long children took on the untimed passage, so that fast readers did the untimed passage in less than one minute; medium, between one and two minutes; and slow, between two and three minutes. The purpose of this comparison was to determine whether there were any inflection points in reading fluency speed over time in the passage.

Given the large number of zero scores, it makes sense that the average fluency rates for those who took less than one minute were less than for those who took between one and two minutes. While the differences were very small in magnitude, the fluency rates were lower for the one-minute passage for fast readers for both languages, but higher for the one-minute passage for medium and slow readers. As mentioned earlier, this suggests that if children do not finish the passage in one minute, they actually slow down their reading rates. Therefore, giving more time to children did not help with even the basic strategy that it was theorized to support. The widest gaps were for the slow pupils, so the finding applies particularly to them, as these children seemed to realize that they could not read well or comprehend and therefore they slowed down.

Figure 97. Average Kiswahili oral reading fluency, timed vs. untimed

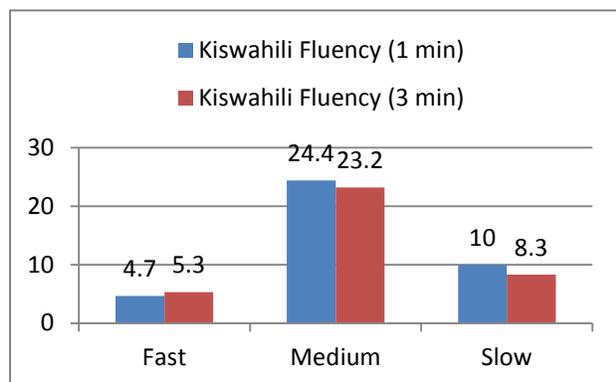
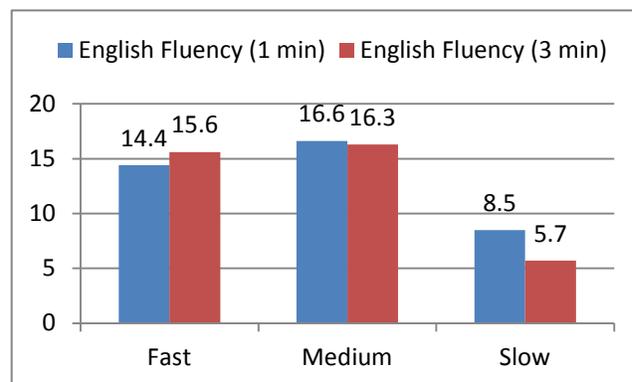


Figure 98. Average English oral reading fluency, timed vs. untimed



The story was slightly different in the area of comprehension. For English, all three groups of children (fast, medium, and slow) did better on comprehension on the three-minute passage than on the one-minute passage, although there did not seem to be a great deal of difference between the difference for medium (4.5%) and slow (3.2%) readers (Figure 99). This was more the case with Kiswahili (Figure 100), as the gap for the slowest readers was 7.0%, while the other gaps were small (medium, 2.8%) or negative (fast, -2.2%). This implies that reading slowly does not help with fluency, but it appears to help with comprehension a very small amount.

Figure 99. Average English reading comprehension, timed vs. untimed

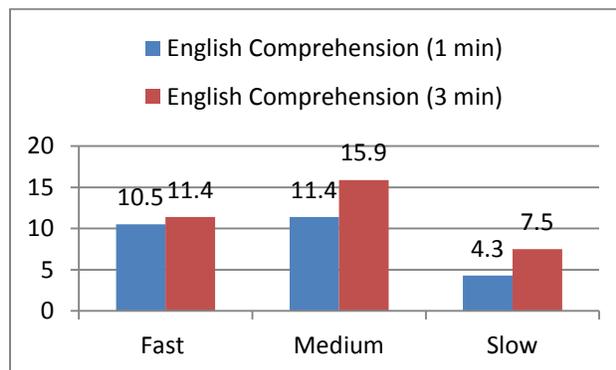
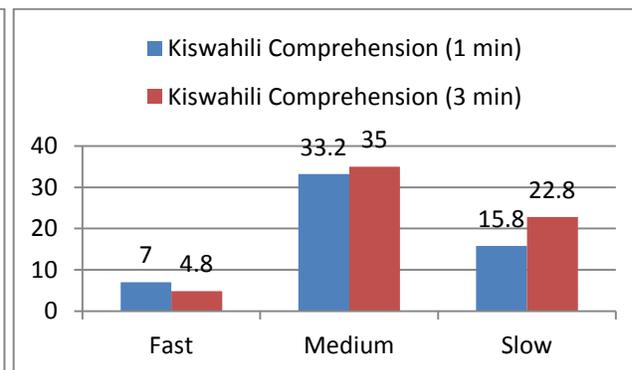


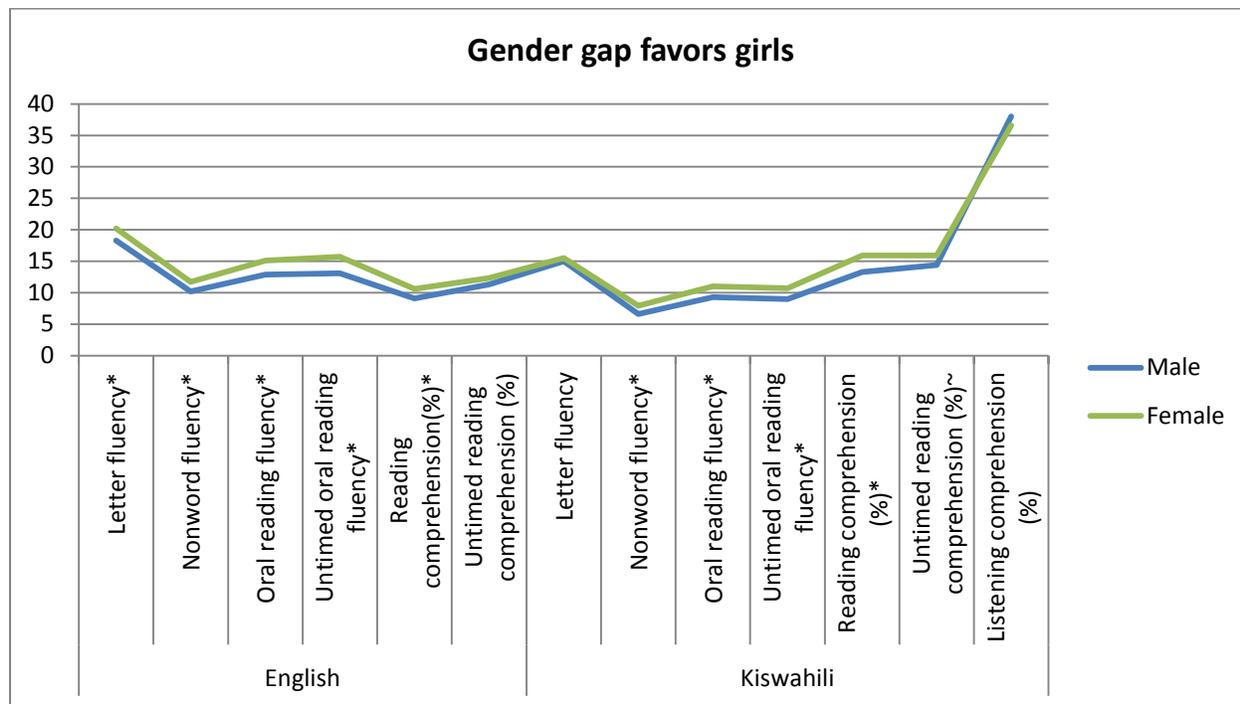
Figure 100. Average Kiswahili reading comprehension, timed vs. untimed



The evidence from the EGRA study showed a consistent, if small, advantage for learning outcomes for girls. Figure 101 shows that for nearly all of our assessed subtasks and for both English and Kiswahili, girls outperformed their boy counterparts in school. This was true for both Class 1 and Class 2. The asterisks indicate statistically significant differences. The gender gap existed for all items except for English untimed reading comprehension, letter fluency, and listening comprehension; the untimed Kiswahili comprehension difference was significant only at the .10 level. This finding is mirrored in early primary assessments of literacy skills in many

parts of the developed world, but it is less likely to occur in the poorest countries of the world. This suggests that, for Kenya, at least in the urban and peri-urban locations on which PRIMR is focusing, the major impediments to equal learning for girls in Class 1 and 2 have been overcome, and their natural talents for language, literacy, and learning have been allowed to be exhibited. That should not discount the substantial gains that both boys and girls need to make to have basic literacy skills.

Figure 101. Boys' and girls' average EGRA subtask scores, English and Kiswahili



*Statistically significant

~ Significant at .10 level

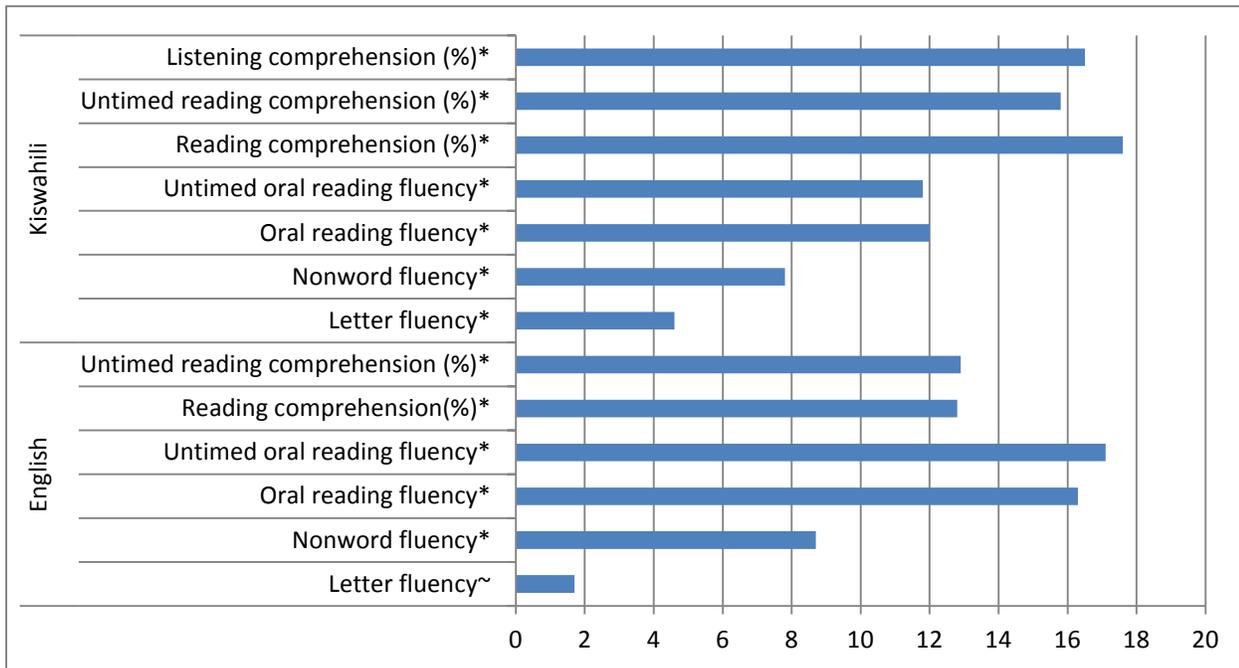
6.3 Reading Assessment Outcomes vs. Selected SSME Data

6.3.1 Class

The richness of the PRIMR baseline and SSME data allows us to investigate the relationships between the outcomes of interest and class. The method for this analysis was to estimate the difference between the average scores for Class 1 and Class 2 children, and whether those differences were statistically significant. Figure 102 presents our results. We found statistically significant differences between Class 1 and 2 outcomes for all of the subtasks except for letter fluency in English, where the differences were significant only at the .10 level. With respect to fluency gaps, letter fluency class level differences were quite modest: just over 4 and under 2 letters per minute for Kiswahili and English, respectively. This suggests that children do not learn letters in Class 1, which points to the assumptions that teachers make about what skills children have when they arrive in Class 1. For Kiswahili, oral reading fluency gaps were nearly 12

wpm for Kiswahili and 16 wpm for English. The English gaps were slightly larger than typically found in other countries, meaning that as abysmal as the findings were, some learning is taking place in Class 1. Comprehension percentage differences were quite large, averaging 16% or so for Kiswahili and over 12% for English. Children certainly are learning in Class 1, but perhaps not as efficiently as we might hope.

Figure 102. Learning outcomes for Class 2 (differences between Class 1 and Class 2)



*Statistically significant

~Significant at .10 level

Figure 103 and Figure 104 present the ages of children in our sample disaggregated by class and separated by formal and nonformal schools. In formal schools, in Class 1, 33.1% of children were age 6 or 7 in Class 1, with only 6.1% being 5 years old. In formal schools in Class 2, 36.6% of children were 7 or 8, with only 4.5% under-age at 6. The story was very different in nonformal schools: 36.3% of children in Class 1 were 6 or 7, higher than in formal, but a larger percentage were 5 (10.1%). In Class 2, 34.4% were 7 or 8, but a larger percentage were under-age (9.4%). It appears that children might be admitted earlier in nonformal schools than in formal schools, and that at the same time, fewer over-age children are attending nonformal schools. More research is necessary to understand the enrolment decisions of parents in these two types of schools.

Figure 103. Ages of sampled pupils, by class, formal schools

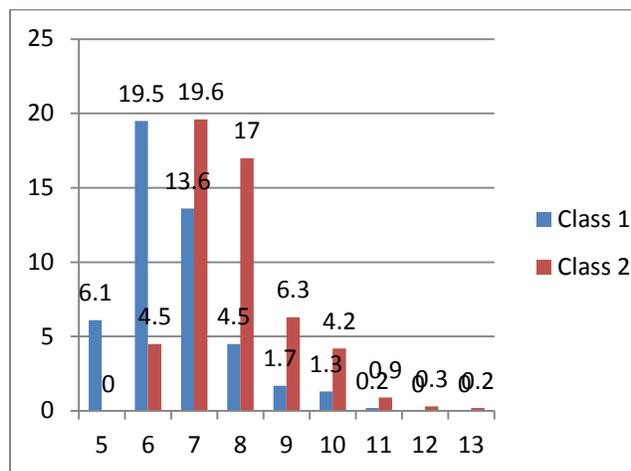
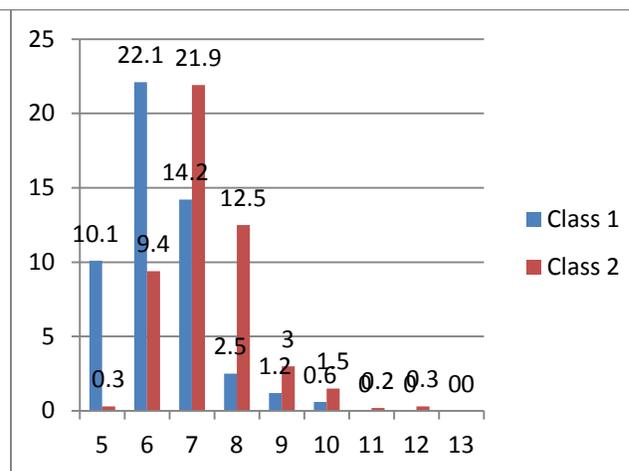


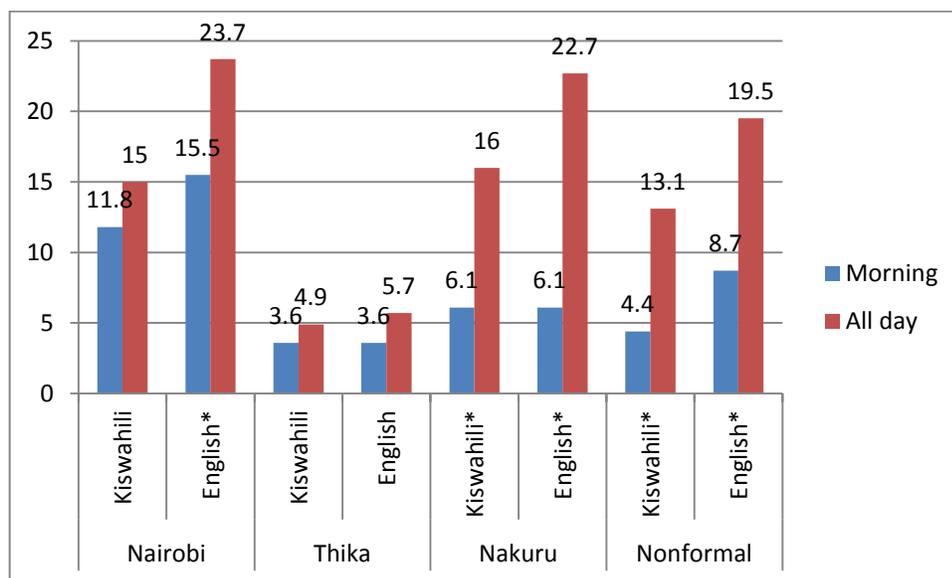
Figure 104. Ages of sampled pupils, by class, nonformal schools



6.3.2 School Shifts

Several basic variables in the PRIMR baseline and SSME data set are influential in the relationship between the outcomes and important predictors such as oral reading fluency. Figure 105 shows how being enrolled in a school that had shifts (most often with the Class 1 and 2 children taking the morning shift) was related to oral reading fluency. In the sample, 27.8% of the children were attending shift schools, with more than half of the children in Thika and most of the children in Nakuru attending such schools. The lowest percentage of shift schools was found in nonformal schools, as those schools double as daycare for working parents. Figure 105 shows that children in all-day programs outperformed those in morning programs in Nakuru and nonformal schools, as well as in English in Nairobi. Thika demonstrated no statistically significant difference, nor did Nairobi in Kiswahili. That said, the direction of the relationship even in the insignificant comparisons was the same: Children in all-day schools outperformed those in morning programs. We cannot make any certain claims about the direction of causality, because other factors that make a school only offer morning sessions could be driving low achievement and the shift, rather than the other direction. In any case, this analysis suggests that shifts are something for the system to carefully examine.

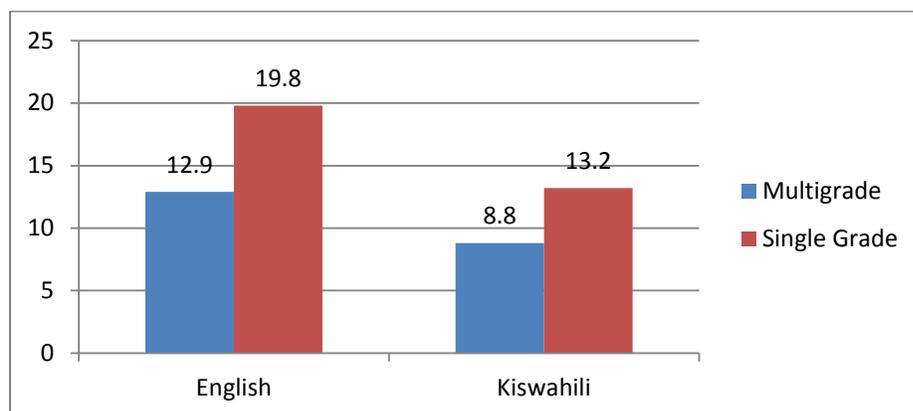
Figure 105. Average oral reading fluency scores, by school shift



6.3.3 Multigrade Classrooms

In some of the nonformal education institutions, we noticed that some classrooms were multigrade classrooms, in that one physical space included more than one classroom, or that one teacher was teaching more than one grade. This happened infrequently if at all in the schools we investigated in the formal sector. Even in the nonformal sector, it happened to only 2.7% of our sample. That said, it is worth noting the effects of multigrade on pupil outcomes. Figure 106 shows that being in a multigrade classroom was associated with 6.9 wpm less in English and 4.4 wpm less in Kiswahili.

Figure 106. Effect of multigrade classrooms on oral reading fluency, nonformal schools

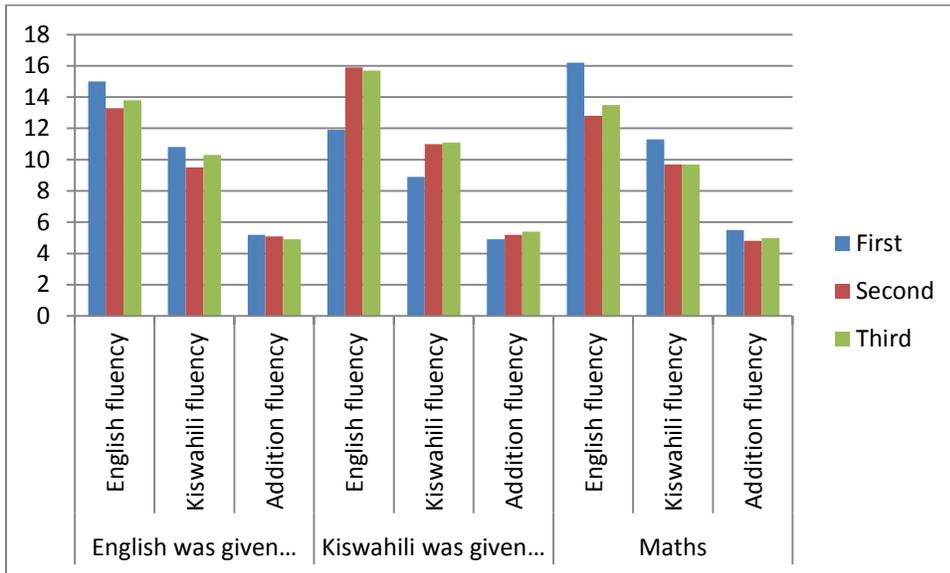


6.3.4 Order of Assessment

During the PRIMR baseline and SSME data collection, the PRIMR team took great care to randomize the order of assessment for children, so that test fatigue would not adversely affect one particular assessment over another. We also noted in what order the assessments were given

so that we could analyse whether there were any statistically significant differences by order of assessment. Results are presented in Figure 107 below. These data and the associated statistical significance tests show no apparent systematic relationships between order of assessment and pupil outcomes.

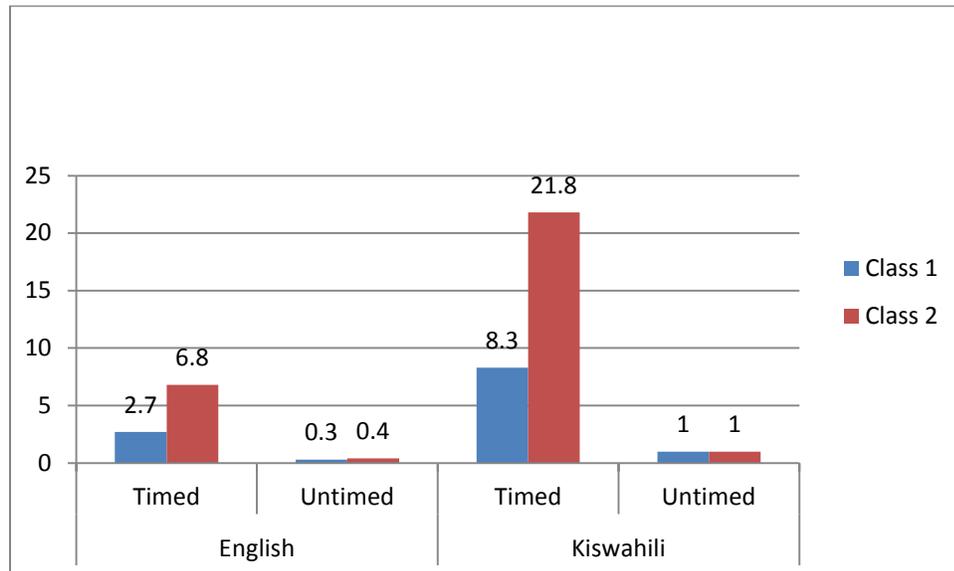
Figure 107. Average oral reading fluency and addition results, by order of assessment



6.3.5 Total vs. Attempted

Previous baseline EGRA analyses presented the comprehension scores of pupils based on the total attempted and on the absolute number of questions for each story. This was done because we were not sure whether the attempted scores were inflating pupils' outcomes or whether the absolute score was deflating them. The data from this study show with some confidence that the appropriate measure to report is on the *total* reading comprehension score, rather than *attempted*. Figure 108 shows the percentage difference between these two scores for the timed and untimed passages for Kiswahili and English and for Class 1 and 2. If we present the attempted scores in Kiswahili, the differences are quite large, up to 21.8% in Class 2. This appears to be an inappropriate decision, however, as the differences between the scores were negligible for the untimed passage. If children did not have the chance to read with sufficient fluency to be asked a certain question, they were extremely unlikely to have been able to answer that question anyway, and so the attempted score would inflate their true ability.

Figure 108. Percentage difference between attempted and total scores, timed and untimed passages, English and Kiswahili, Classes 1 and 2



6.3.6 School-Level Means

While histograms from individual fluency scores mask wide differences, the school level means are much clearer, and make it easier to see patterns, particularly across locations. Figure 109 and Figure 110 present histograms of school-level mean fluency rates by location for Kiswahili (on the left) and English (right). As we examine the Kiswahili data, it is clear that nonformal schools had a nearly normal distribution for both English and Kiswahili. There was a great deal more skew for the other locations, with Nakuru having the highest proportion of schools with average fluency rates at or near zero, for both Kiswahili and English. Thika's distribution had the highest proportion of schools between 0 and 5 wpm on average, although with slightly fewer zero score averages than Nakuru.

These histograms show that even at the school level, the vast majority of schools in this urban and peri-urban sample are struggling with their basic reading outcomes. An improvement program that will improve this at scale will require dramatic and fundamental changes.

Figure 109. School-level mean oral reading fluency, by location, Kiswahili

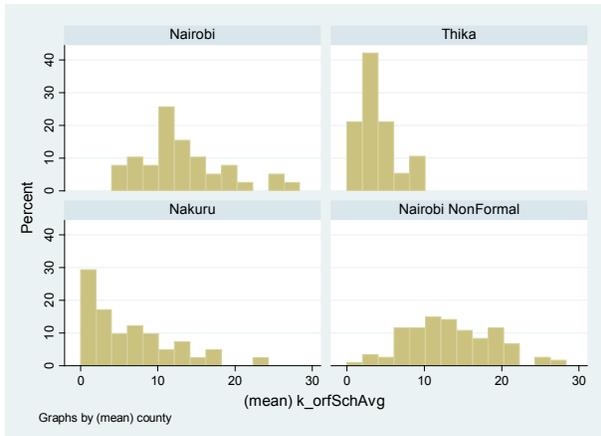
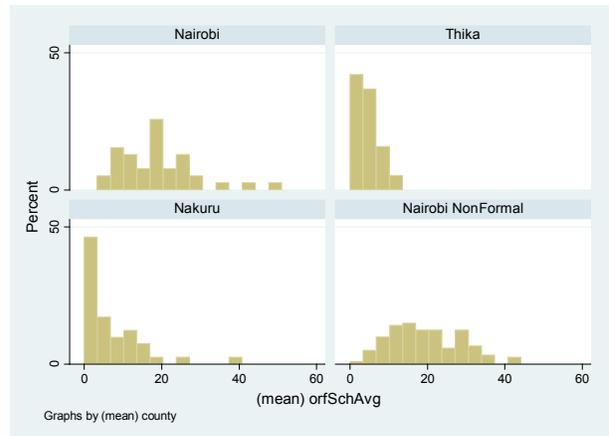


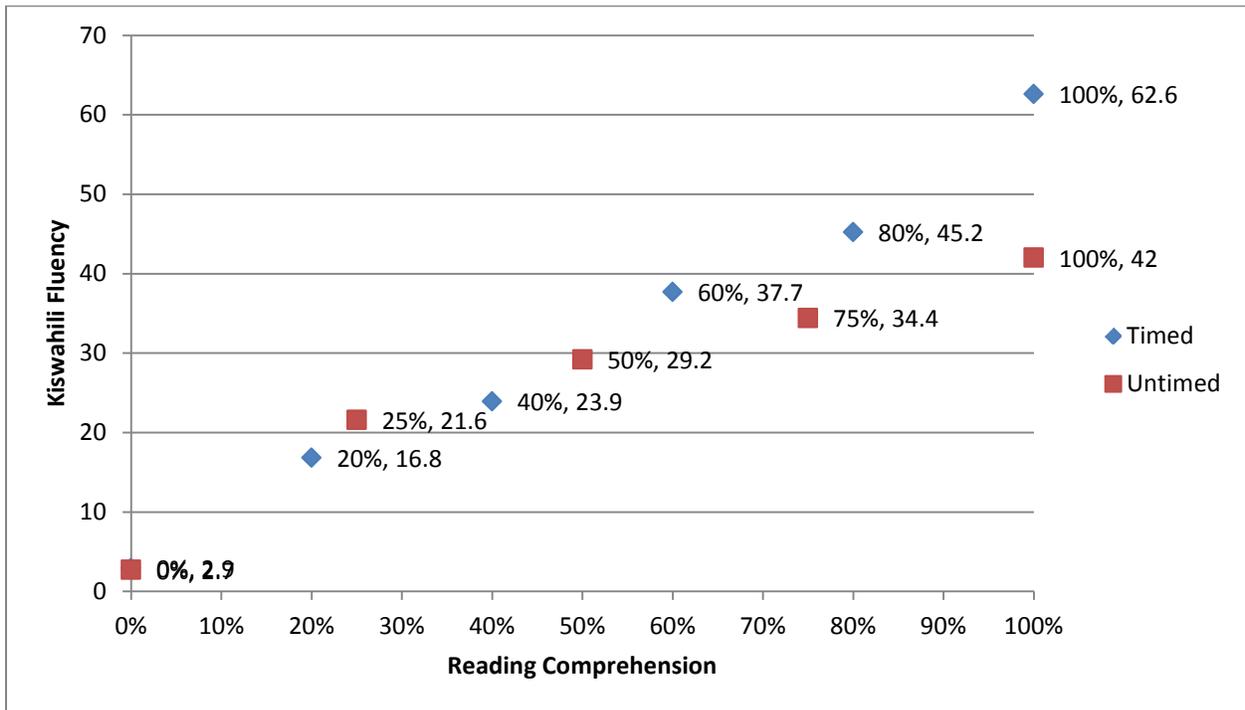
Figure 110. School-level mean oral reading fluency, by location, English



6.4 Reading Fluency vs. Comprehension in Two Languages

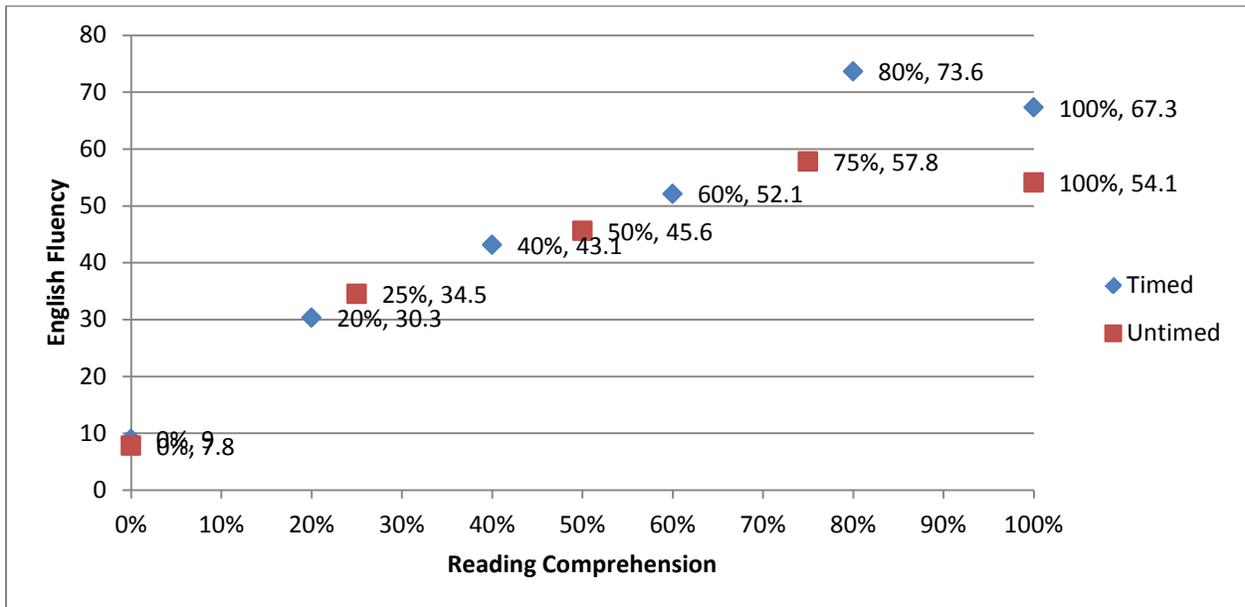
The expansive data set provided by the PRIMR baseline and SSME data collection allows us to investigate the relationship between fluency and comprehension in both Kiswahili and English—unlike previous studies, where we were able to track fluency and comprehension for only one story. In this data set, we can look at two stories and associated comprehension questions. Results are presented in Figure 111. The red squares are the comprehension and fluency rates for untimed Kiswahili passages. The blue diamonds are the comprehension and fluency rates for timed Kiswahili passages. The fluency rates associated with high levels of comprehension were 45 words per minute or higher, to 62.6 wpm for the timed comprehension passage.

Figure 111. Kiswahili fluency and comprehension scores across multiple assessments, timed and untimed subtasks, for benchmarking



While Figure 111 investigated Kiswahili fluency and comprehension, Figure 112 does the same comparison for English. The fluency rates associated with high levels of comprehension ranged from 54.1 wpm for untimed to 73.6 wpm for timed. This provides some evidence for where potential benchmarks and thresholds can and should be set.

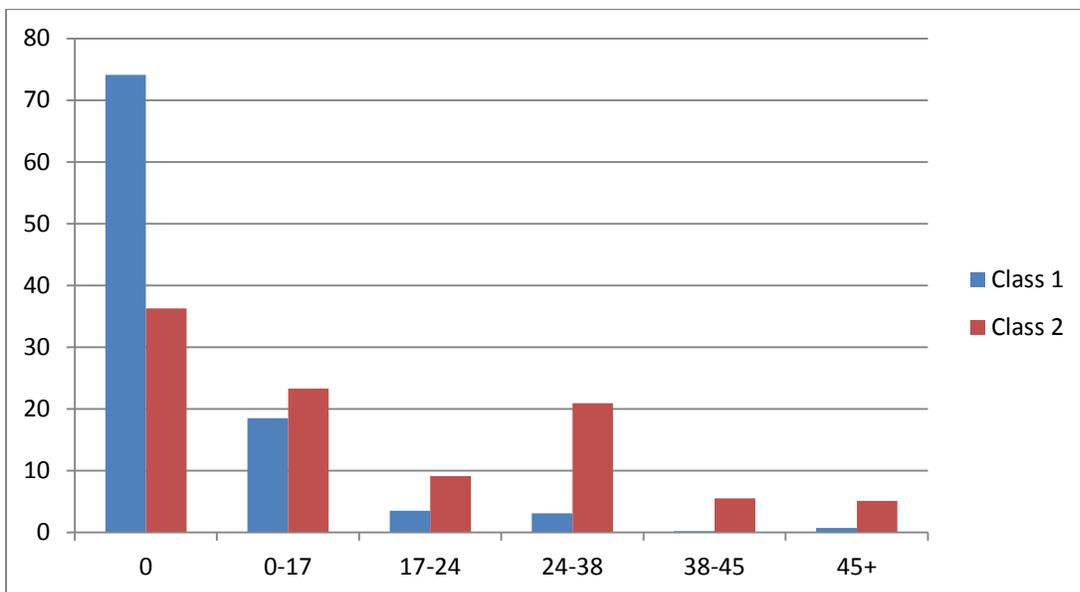
Figure 112. English fluency and comprehension scores across multiple assessments, timed and untimed subtasks, for benchmarking



6.5 Fluency Thresholds and Cut Points

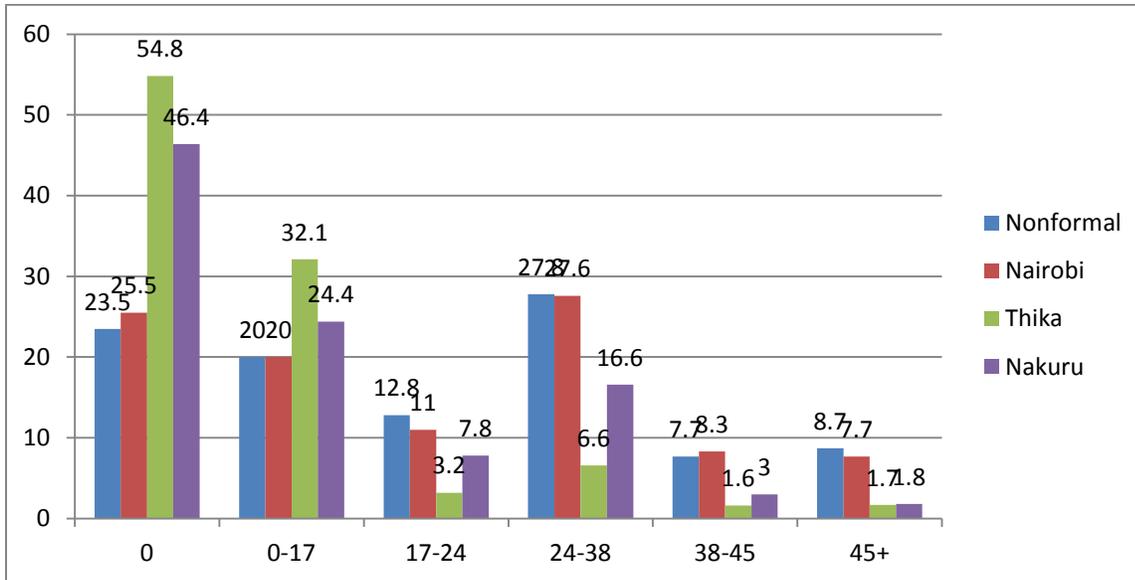
Based on the comprehension and fluency scores above, we suggest potential cut points in the distribution of Kiswahili fluency rates at 0 wpm, 0–17 wpm, 17–24 wpm, 24–38 wpm, 38–45 wpm, and 45 wpm and above. Figure 113 shows the percentage of children at each of these thresholds, by class. Class 2 had quite a reasonable spread of fluency rates between the 0 and 38 wpm thresholds; very few children moved beyond the lowest threshold for Class 1.

Figure 113. Percentage of pupils in each fluency threshold, Kiswahili, by class



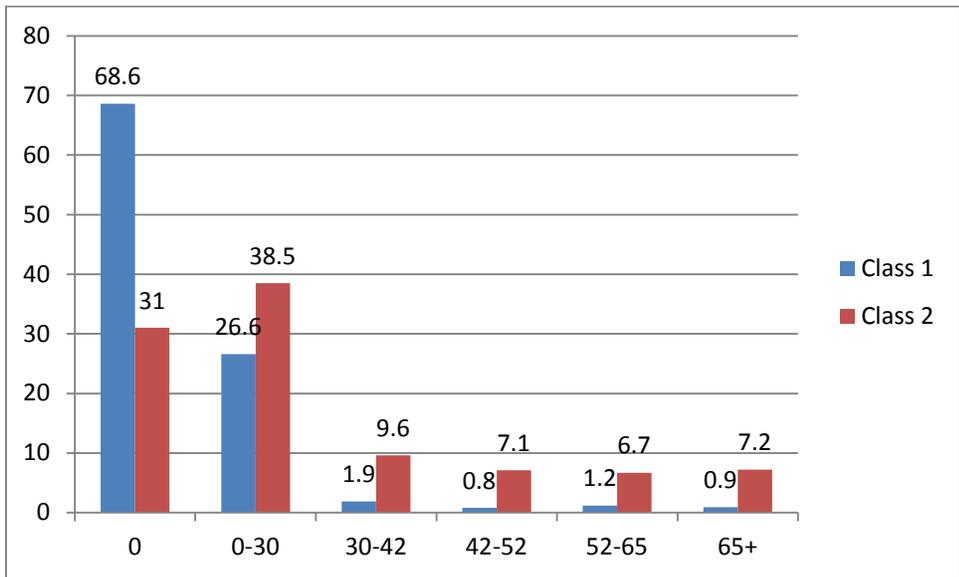
We also were able to look at the thresholds and how they related to the locations in the PRIMR sample (Figure 113). We found quite high percentages of children in Thika and Nakuru at the lowest thresholds, while almost none of the children in Thika and Nakuru read at 38 wpm or above. For Nairobi and nonformal, we found pupils well spread across the distribution, and some of the pupils were at the highest benchmarks (8.7% in nonformal and 7.7% in Nairobi).

Figure 113. Percentage of pupils in each fluency threshold, Kiswahili, by location



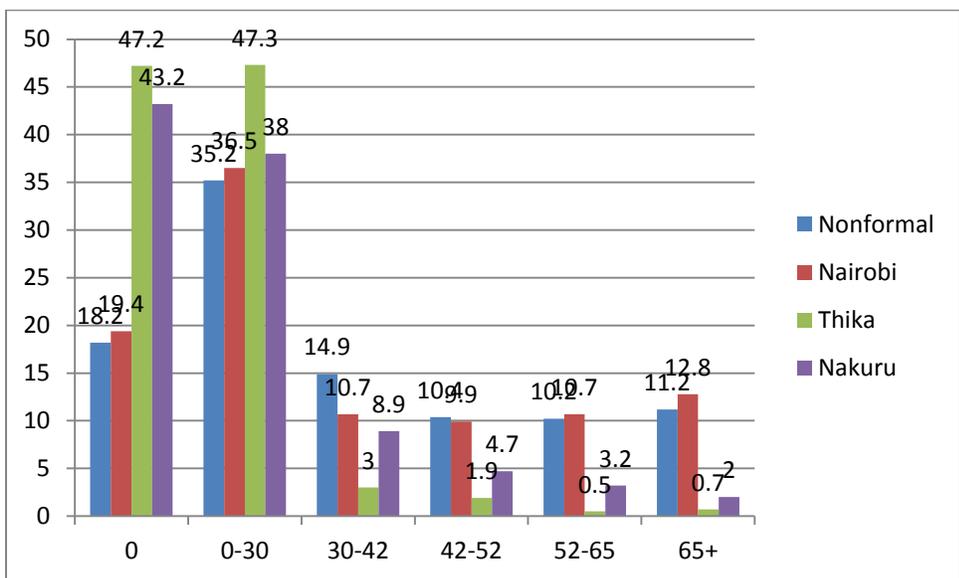
For English, very conservative thresholds would split the distribution of the sample in the manner presented in Figure 114. This shows that in English, 95.2% of the sample in Class 1 reached less than 30 wpm. For Class 2, while the majority of children read less than 30 wpm (69.5%), 6% or more of the sample was able to read at the different benchmarks.

Figure 114. Percentage of pupils in each fluency threshold, English, by class



When we examined these potential thresholds by location, we found wide variations in the distribution by location, particularly in the comparisons between Thika and Nakuru against Nairobi and nonformal (Figure 115).

Figure 115. Percentage of pupils in each fluency threshold, English, by location



In Figure 116 and Figure 117, we present the histograms of the distribution of fluency scores for Kiswahili and English for Class 2. The arrows relate to the potential thresholds for both languages. The lack of variation in the Kiswahili fluency scores shows that the thresholds are not well spread. The opportunity that the PRIMR baseline creates is remarkable, as we can investigate how these thresholds relate to outcomes at the end of the academic year.

Figure 116. Distribution of oral reading fluency scores, Kiswahili, Class 2

Figure 117. Distribution of oral reading fluency scores, English, Class 2

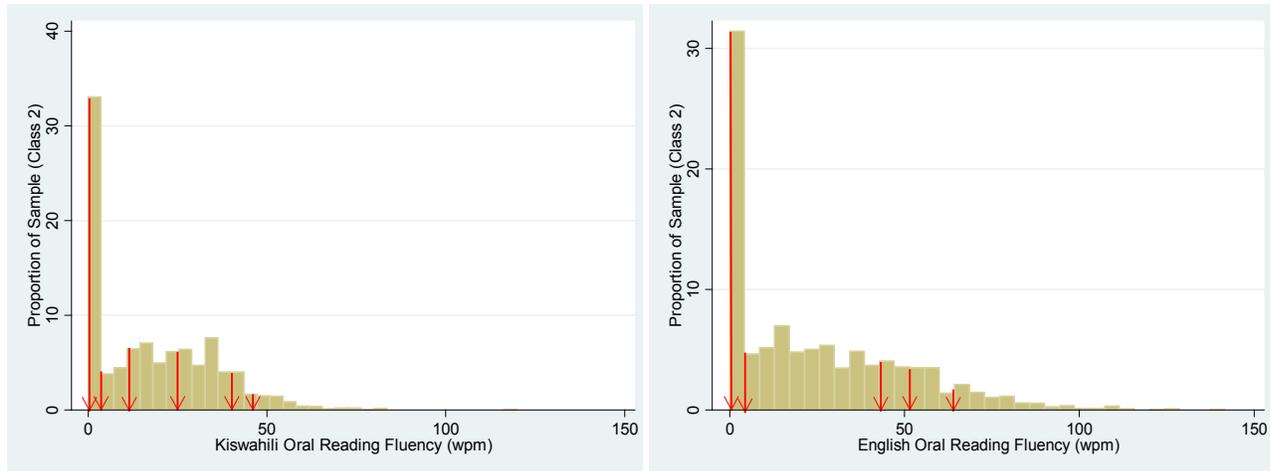
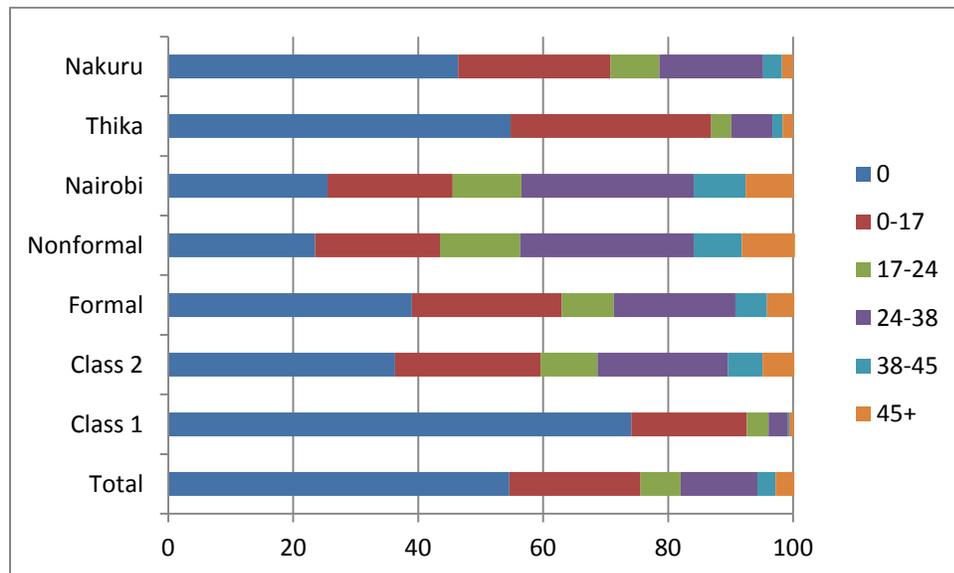


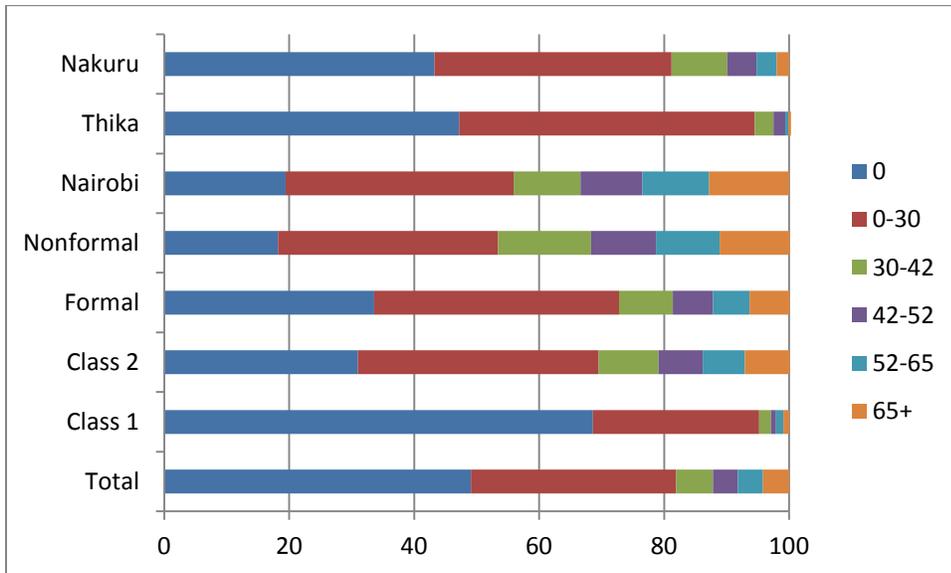
Figure 118 presents the proportion of children at different thresholds in Kiswahili. The threshold associated with fluency and comprehension had a small proportion of children in it, even in Nairobi and nonformal, while large percentages of zero scores emerged in all four locations.

Figure 118. Proportion of pupils at all Kiswahili fluency thresholds, all classes and locations



The English potential thresholds are presented in Figure 119. We found that Nairobi and nonformal schools had reasonably sized percentages of children at each threshold, although more research is necessary to see how these distributions change at the project’s midterm assessment, which will occur at the very end of the 2012 academic year.

Figure 119. Proportion of pupils at all English fluency thresholds, all classes and locations

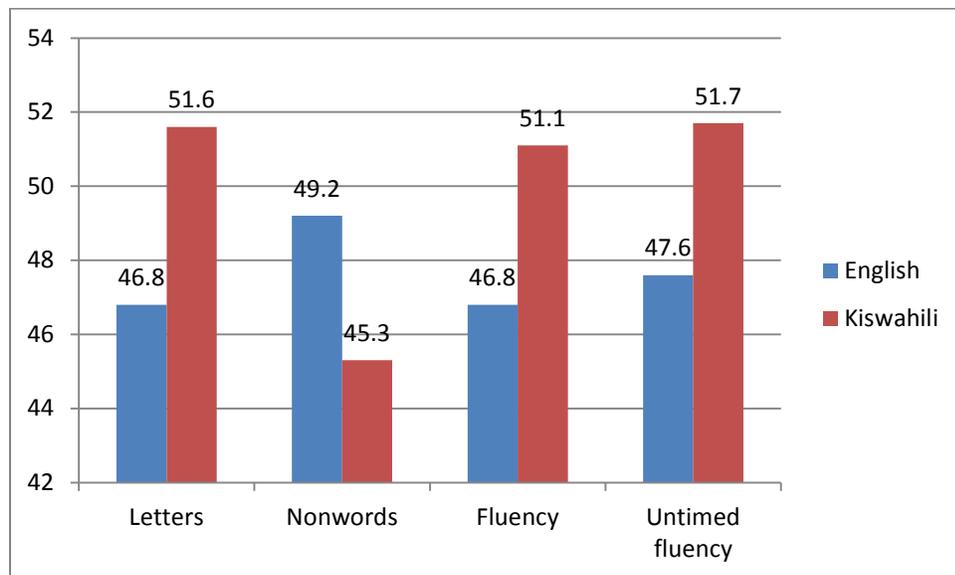


6.6 Accuracy Rates, by Subtask

Discussions above point out the fluency rates for children in the PRIMR baseline sample. We were also interested in knowing the accuracy rates for these children by subtask. These accuracy rates were produced by dividing the number of items correct by the number attempted, and they are presented only for Class 2 children in Figure 120. We present only Class 2 because the accuracy rates in Class 1 were skewed by the very low abilities of these early pupils. If the reading rates followed the typical structure, accuracy rates would be highest for letters, and lowest for fluency, and there would be no difference between timed and untimed fluency. In Kenya, the data revealed a quite different pattern. For Kiswahili, we found that accuracy rates were very similar between letters and fluency, between 51.1% and 51.7% for all three tasks. This is surprising as it shows that children are no less accurate at the story level than the letter level. Nonword accuracy was lower than letters or oral reading fluency, suggesting that the children were not using decoding skills to combine letters and read words. For English, on the other hand, accuracy rates were actually higher for nonwords than for letters or story reading. This is surprising, as we would expect that letter-sound rates would be higher than nonword rates. These Kenyan children, then, did not have a good grasp of letter sounds, yet they were able to decode on the nonword task, but were not likely use those decoding skills to read words. This is completely surprising, and we will need to investigate the midterm findings closely to determine

whether the relationships between accuracy scores change after the PRIMR intervention has had some time to take root.

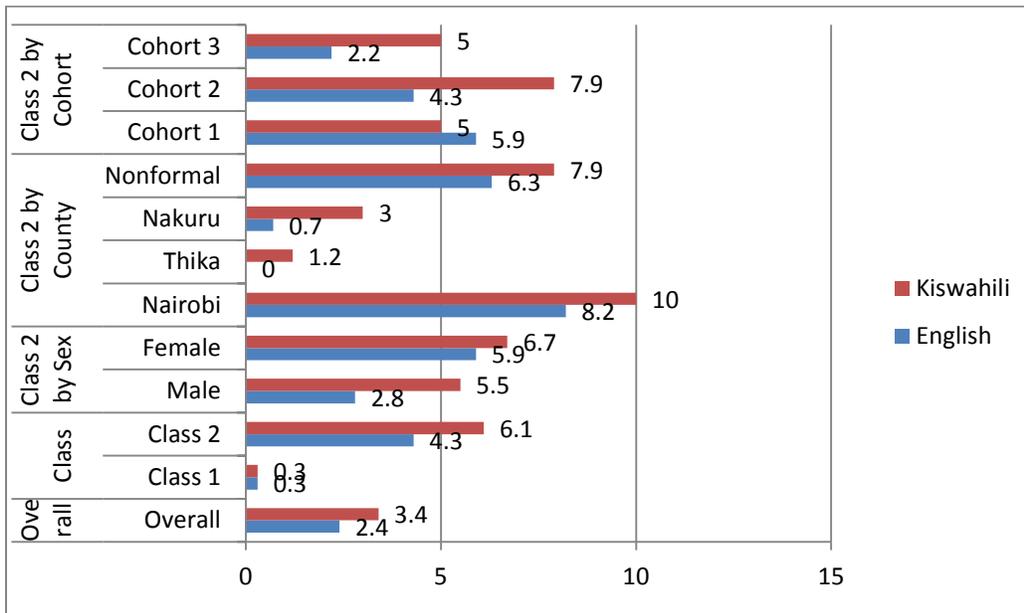
Figure 120. Accuracy rates by language and subtask, Class 2



6.7 Responding to PMP indicators

Based on the PRIMR Performance Monitoring Plan (PMP), we are expected to present on the proportion of children who are reading at the “agreed-upon benchmark” for fluency, and at 80% comprehension, and at both the fluency benchmark and the comprehension benchmark. At this juncture, the fluency benchmark has not been decided upon. However, the baseline data revealed a very low proportion of children reading with comprehension, as Figure 121 shows. Even in Nairobi, only 10% and 8.2% of children in Class 2 were reading with comprehension in Kiswahili and English, respectively. The percentages in Thika were 1.2% and 0%. Overall in Class 2, only 6.1% and 4.3% of children read with comprehension in Kiswahili and English, respectively. We expect that these proportions will increase quite a bit at the midterm, as it is collected at the end of the year rather than the beginning, and the PRIMR-supported schools should show some additional increase, under the assumption that the program was successful. After the findings workshops, PRIMR will be able to present the other proportions reading with fluency and comprehension.

Figure 121. Disaggregated proportions of children reading with 80% comprehension



7. Conclusion and Recommendations

The PRIMR baseline findings present several important recommendations, which have been discussed in some detail with USAID/Kenya and the Ministry of Education. The recommendations include the following:

- **Implement balanced literacy instruction.** Kenyan children have difficulty identifying letters and their relationship with sounds. They also struggle in understanding what they read, even after they manage to identify a few words. Therefore, we recommend that the MOE focus on a balanced literacy program that allows children to increase their phonemic awareness, alphabetic principle, fluency, vocabulary, and reading comprehension skills.
- **Focus specifically on teaching reading.** The findings of the EGRA study and the classroom observations make it very clear that not enough time is spent teaching reading in Kenyan classrooms. Much more time is spent on grammar, with insufficient time with textbooks and no time with reading materials. This is an issue for the curriculum, but also for the quality of instruction in language classrooms.
- **Improve access to reading material.** The convincing evidence that access to reading materials improves reading outcomes suggests that Kenya should consider significant investments in ensuring that each Kenyan pupil has access to reading textbooks and supplementary reading materials. PRIMR believes that these investments can be made at relatively low cost if radical decisions are made about the importance of reading materials for every child. More importantly, the government should support families' efforts to make reading a significant part of daily activities.
- **Set literacy benchmarks.** The PRIMR baseline data and data from previous reading assessments should be used to set benchmarks for literacy outcomes. Previous work on this was undertaken in March 2011, and it should be expanded to guide interventions in reading improvement.
- **Evaluate reading interventions.** Several reading interventions exist in Kenya currently. We recommend that the evidence from internal and external reading interventions in Kenya be examined so that the data can be combined to design a reading intervention at scale in Kenya.
- **Focus on teaching numbers as quantities.** Helping pupils make the link between numbers as mathematical symbols and the quantities they represent prepares children for higher-level maths operations. It also ensures that children are able to apply the basic maths skills they possess.
- **Teach children effective maths problem-solving strategies.** The poor results in addition, subtraction, and word problems can be attributed to inefficient problem-solving strategies. Most pupils use traditional methods of fingers and tick marks, which are prone to errors and consume time.

- **Address gender in early instruction.** The results showed that girls outperformed boys in reading and in some maths subtasks, and some subtasks showed no differences by gender. It is encouraging that girls are more likely to perform at their natural capabilities in the early levels. The MOE should ensure that teachers have strategies for addressing the learning needs of boys and girls.

References

- Carpenter, T. P., & Moser, J. M. (1984). The acquisition of addition and subtraction concepts in grades one through three. *Journal for Research in Mathematics Education*, 15(3), 179–202.
- Clarke, B., & Shinn, M. R. (2004). A preliminary investigation into the identification and development of early mathematics curriculum-based measurement. *School Psychology Review*, 33(2), 234–248.
- Clarke, B., Baker, S., Smolkowski, K., & Chard, D. J. (2008). An analysis of early numeracy curriculum-based measurement: Examining the role of growth in pupil outcomes. *Remedial and Special Education*, 29(1), 46–57.
- Gersten, R., Jordan, N. C., & Flojo, J. R. (2005). Early identification and interventions for pupils with mathematics difficulties. *Journal of Learning Disabilities*, 38(4), 293–304.
- Griffin, S., & Case, R. (1997). Re-thinking the primary school math curriculum: An approach based on cognitive science. *Issues in Education*, 3(1), 1. Retrieved September 6, 2009, from Academic Search Premier database.
- Groen, G. J. & Parkman, J. M. (1972). A chronometric analysis of simple addition. *Psychological Review*, 79(4), 329–343.
- Groen, G., & Resnick, L. B. (1977). Can preschool children invent addition algorithms? *Journal of Educational Psychology*, 69(6), 645–652.
- Kenya National Bureau of Statistics (KNBS). (2009). *Population and housing census*. Nairobi: Kenya Government Printers.
- Ministry of Education [MOE]. (2008). *Statistical booklet*. Nairobi: Kenya Government Printers.
- National Council of Teachers of Mathematics (NCTM). (2008). *2007 TIMSS shows continued improvement in math*. Retrieved January 1, 2009, from <http://www.nctm.org/news/content.aspx?id=17021>
- Ominde, S. H. (1964). *Kenya Education Commission Report*. Republic of Kenya. Nairobi: Government Printer.
- Piper, B. (2010). *Kenya Early Grade Reading Assessment findings report*. Prepared for the William & Flora Hewlett Foundation. Research Triangle Park, North Carolina: RTI International and East African Development Consultants.
- Piper, B., & Miksic, M. (2011). Mother tongue and reading: Using early grade reading assessments to investigate language-of-instruction policy in East Africa. Chapter 4 in A. Gove & A. Wetterberg (Eds.) *The Early Grade Reading Assessment: Applications and*

- interventions to improve basic literacy* (pp. 113–137). Research Triangle Park, North Carolina: RTI Press.
- Piper, B., Trudell, B. & Schroeder, L. (2012). *Fluency or comprehension? How language skills impact reading outcomes in multilingual Kenya*. (manuscript in progress)
- Republic of Kenya (1976). *Report of the National Committee on Educational Objectives and Policies (Gachathi Report)*. Nairobi: Government Printer.
- Republic of Kenya. (1988). *Report of the Presidential Working Party on Education and Manpower Training for the Next Decade and Beyond (Kamunge Report)*. Nairobi: Government Printer.
- Republic of Kenya. (1999). *Report of the Commission of Inquiry into the Education System of Kenya (Koech Report)*. Nairobi: Government Printer.
- Reubens, A., & Crouch, L. (2009). *Early Grade Mathematics Assessment (EGMA): A conceptual framework based on mathematics skills development in children*. Prepared under the USAID EdData II project, Contract No. EHC-E-02-04-00004-00. Research Triangle Park, North Carolina: RTI International.
- Riley, M. S., & Greeno, J. G. (1988). Developmental analysis of understanding language about quantities and of solving problems. *Cognition and Instruction*, 5(1), 49–101.
- Uwezo. (2010). *Annual learning assessment report*. Nairobi: Uwezo.

Annex A. Sample Instruments



Uchunguzi wa Kusoma katika Madarasa ya Chini Nchini Kenya: Fomu ya Majibu ya Mwanafunzi
Maelekezo na Mwongozo wa Mchunguzi, (Baseline)
KISWAHILI

Maelekezo ya Jumla:

Wakati wa kufanya uchunguzi huu, ni muhimu kuonyesha mwelekeo wa kucheza na kuburudika na wanafunzi kwa kuanza kuzungumza nao juu ya maswala rahisi yatakayowapendeza (tazama mfano ulioko hapa chini). Mwanafunzi anapaswa kuchukulia uchunguzi huu kama mchezo wa kujifurahisha kuliko mtihani wa kuogopewa. Ni muhimu kusoma TU zile sehemu zilizo ndani ya visanduku pole pole na kwa ufasaha.

Hujambo! Jina langu ni _____ na ninaishi _____. Ningependa kukueleza kidogo kunihusu. (Mwambie kwa ufupi kuhusu familia yako, idadi ya watoto wako na umri wao, michezo upendayo, n.k.)
1. Hebu nieleze kwa ufupi kuhusu familia yako. (Ngojea jibu la mwanafunzi kwa muda mfupi. Ukiona kwamba anasita, uliza swali la pili; lakini asiposita, enda kwenye sehemu ya idhini ya Kusemwa.
2. Unapenda kufanya nini wakati haupo shuleni?

Idhini ya Kusemwa

- Hebu nikueleze sababu za kuja kwangu hapa hivi leo. Ninafanya kazi na Wizara ya Elimu na tunafanya uchunguzi kuhusu jinsi wanafunzi hujifunza kusoma. Ulichaguliwa kushiriki kwa bahati, kama katika mchezo wa bahati nasibu.
- Tunakuomba ushirikiane nasi katika shughuli hii. Lakini usishiriki katika shughuli hii iwapo hutaki.
- Tutacheza mchezo wa kusoma. Nitakuuliza usome herufi, maneno na hadithi fupi kwa sauti.
- Nitatumia hii saa ya kasi ili kupima muda utakaotumia kusoma.
- Huu SIO mtihani na alama zako za mitihani shuleni hazitaathirika.
- SITAANDIKA jina lako po pote. Kwa hivyo, mtu hawezi kujua kwamba majibu haya ni yako.
- Kumbuka kwamba una hiari ya kutoshiriki katika shughuli hii. Vile vile, tutakapoanza shughuli hii, utajibu maswali kwa hiari yako na ni sawa iwapo hutaki kujibu swali.
- Je, una swali lo lote? Uko tayari kuanza?

Tia alama ya sahihi ikiwa mwanafunzi ametoa idhini: **NDIO**

(If verbal consent is not obtained, thank the child and move on to the next child, using this same form)

A. Date of Assessment :	Day : _____ Month: _____
B. Enumerator's Name :	
C. School Name :	
D. District:	
E. Zone:	
F. School Shift :	1 = Full day 2 = Morning only 3 = Afternoon only
G. Multigrade Class ?	0 = No 1 = Yes
H. Order of Assessment	1 = First 2 = Second 3 = Third

I. Class:	1 = Class One 2 = Class two
J. Stream Name:	
K. Pupil Unique Code:	
L. Student's Age :	
M. Student's Gender	1 = boy 2 = girl
N. Time Started:	____ : ____ AM / PM

Sehemu ya Kwanza: Ufahamu wa Herufi

Muonyeshe mwanafunzi orodha ya herufi iliyomo katika kijitabu cha mwanafunzi. Kisha sema ifuatavyo:

Karatasi hii ina herufi mbali mbali. Tafadhali zitamke herufi zote unazozijua. Kwa mfano, herufi hii [kisha mwonyeshe herufi k) ni “ka”

Hebu tufanye mazoezi: Nitamkie herufi hii [mwonyeshe herufi A]:
Iwapo jawabu la mwanafunzi ni sahihi, sema : **Vyema, herufi hii ni “a”**
Iwapo jawabu la mwanafunzi sio sahihi, sema: **Herufi hii ni “a”**

Sasa, hebu jaribu herufi nyingine: nitamkie herufi hii [mwonyeshe herufi m]:
Iwapo jawabu la mwanafunzi ni sahihi, sema: **Vyema, herufi hii ni “ma”**
Iwapo jawabu la mwanafunzi sio sahihi, sema: **Herufi hii ni “ma”**

Je, umeelewa unavyopaswa kufanya?

Nikisema “Anza”, tafadhali zitamke herufi hizi haraka iwezekanavyo lakini kwa makini. Nitamkie herufi, kuanzia hapa kisha kuendelea hivi. [Elekeza kidole chako katika herufi ya kwanza katika mstari wa juu baada ya mfano kisha undelele hadi mwisho wa mstari huo]. Nitanyamaza nikusikilize. Uko tayari? Anza.



Anzisha saa ya kupimia kasi pindi mwanafunzi asomapo herufi ya mwanzo. Fuatilia kusoma kwake ukitumia penseli kisha utie alama ya mkwaju (/) katika kila herufi ambayo hakuweza kuitamka. Iwapo, mwanafunzi anajisahihisha, jibu hilo ni sahihi. Iwapo ulikuwa umemkosoa mwanafunzi katika jibu ambapo alijisahihisha, tia alama ya duara (O) kwa herufi hiyo kisha uendele. **Unapaswa kukimya**, isipokuwa wakati unampa mwanafunzi majibu, ifuatavyo: Iwapo mwanafunzi anasita kwa muda wa sekunde 3, mpe jawabu halafu mwelekeze katika herufii inayofuata kisha umwambie **“Tafadhali endelea”**. Kisha utie alama ya kuonyesha hakupata jibu sahihi.

BAADA YA SEKUNDE 60 SEMA, “Acha kusoma.” Halafu tia alama ya mabano (]) katika herufii ya mwisho aliyosoma.

Kanuni ya kusitisha kusoma mapema: Iwapo mwanafunzi hatapata jawabu sahihi hata moja katika mstari wote wa juu, hata kwa kujikosoa, sema **“Asante!”** Sitisha shughuli hii, kisha utie alama katika kisanduku kilicho chini ya ukurasa huu na uendele na sehemu inayofuata.

Mifano: k A m

1	2	3	4	5	6	7	8	9	10	
m	a	N	O	h	a	n	U	ng'	A	(10)
l	a	gh	K	l	R	a	u	e	i	(20)
Dh	i	a	a	m	k	A	d	i	w	(30)
U	n	g	k	u	g	S	A	l	a	(40)
n	Ny	Y	e	t	n	a	l	i	N	(50)
a	a	z	y	h	k	V	D	b	l	(60)
M	a	s	sh	o	a	i	n	m	i	(70)
a	A	i	l	O	B	W	Z	p	o	(80)
i	t	k	L	th	a	u	E	i	T	(90)
A	f	i	m	e	ch	w	u	u	n	(100)

Muda uliosalia katika saa ya kupima kasi kufikia mwisho wa kusoma (idadi ya SEKUNDE) :

Tia alama katika kisanduku hiki iwapo shughuli ya kusoma ilisitishwa kwa sababu mwanafunzi hakupata jawabu sahihi katika mstari wa kwanza.

Sehemu ya Pili: Kutambua Maneno ya Kubuni

Muonyeshe mwanafunzi orodha ya maneno ya kubuni iliyomo ndani ya kijitabu cha mwanafunzi, halafu sema,

Karatasi hii ina maneno yaliyobuniwa. Ningependa usome maneno yote unayoweza. Kwa mfano, neno hili la kubuni ni: “ju”

Hebu tufanye mazoezi: tafadhali lisome neno hili [mwonyeshe neno “huka”]

[Iwapo mwanafunzi atasema “huka”, mwambie]: “Vizuri sana : “huka”

[Iwapo mwanafunzi hakusoma neno “huka” vizuri, mwambie]: **Neno hili la kubuni ni “huka.”**

Sasa, hebu jaribu neno lingine la kubuni: Tafadhali soma neno lifuatalo mwonyeshe neno: “fisa”.

[Iwapo mwanafunzi atasema “fisa”, mwambie]: “Vizuri sana : “fisa”

[Iwapo mwanafunzi hakusoma neno “fisa” vizuri, mwambie]: **Neno hili la kubuni ni “fisa.”**

Nikisema “Anza”, yasome maneno haraka iwezenavyo lakini kwa makini. Yasome maneno kutoka upande wa kushoto kuelekea upande wa kulia wa ukurasa huu, ukianza mstari wa kwanza. Nitakimya nikusikilize, isipokuwa wakati unapohitaji usaidizi. Je, umelewa jinsi unavyopaswa kufanya? Uko tayari? Anza.



Anzisha saa ya kupimia kasi pindi mwanafunzi asomapo neno la kwanza. Fuatilia kusoma kwake ukitumia penseli kisha utie alama ya mkwaju (/) katika kila neno ambalo hakusoma vilivyo. Iwapo, mwanafunzi anajisahihisha, jibu hilo ni sahihi. Iwapo ulikuwa umemkosoa mwanafunzi katika jibu ambapo alijisahihisha, tia alama ya duara (O) kwa neno hilo kisha uendelee. **Unapaswa kukimya**, isipokuwa wakati unampa mwanafunzi majibu, ifuatavyo: Iwapo mwanafunzi anasita kwa muda wa sekunde 3, mpe jawabu halafu mwelekeze katika neno linalofuata kisha umwambie “**Tafadhali endelea.**” Kwa kila neno unalomsomea mwanafunzi, tia alama ya kuonyesha hakupata jibu sahihi.

BAADA YA SEKUNDE 60 SEMA, “Acha kusoma.” Halafu tia alama ya mabano (J) katika neno la mwisho alilosoma.

Kanuni ya kusitisha kusoma mapema: Iwapo mwanafunzi hakusoma vilivyo maneno yote katika mstari wa kwanza, sema “**Asante !**”, sitisha shughuli hii, kisha utie alama katika kisanduku kilicho chini ya ukurasa huu na uendelee na sehemu inayofuata.

Mifano: ju huka fisa

1	2	3	4	5	
zefu	sine	chena	ngute	kuvi	(5)
ndweku	sharu	bwara	dusu	ndise	(10)
howe	ngiso	leye	gazu	honzi	(15)
kabe	hungu	vili	kenzi	regu	(20)
rime	rubwa	ripi	nziki	mwela	(25)
mapa	ndaho	nyuza	mbeta	nzinga	(30)
josa	mtofi	riki	vube	choyu	(35)
yota	vicha	msino	gowe	mwate	(40)
nepu	ndami	fipe	kengu	kine	(45)
shifi	chuso	toko	mtozo	hefa	(50)

Muda uliosalia katika saa ya kasi kufikia mwisho wa kusoma (idadi ya SEKUNDE):

Tia alama katika kisanduku hiki iwapo shughuli ya kusoma ilisitishwa kwa sababu mwanafunzi hakupata jawabu sahihi katika mstari wa kwanza.

Sehemu ya Tatu (a): Kusoma Hadithi kwa Sauti

Muonyeshe mwanafunzi hadithi iliyomo katika kijitabu cha mwanafunzi. Halafu sema hivi,

Hii hapa ni hadithi fupi. Ningependa uisome kwa sauti, haraka iwezekanavyo lakini kwa makini. Ukimaliza kuisoma, nitakuuliza maswali kuhusu yale uliyosoma. Je, umeelewa jinsi unavyopaswa kufanya? Nikisema “Anza,” isome hadithi vizuri kadri ya uwezo wako. Nitanyamaza nikusilikilize. Uko tayari? Anza.

 Anzisha saa ya kupimia kasi pindi mwanafunzi asomapo neno la kwanza. Fuatiliza kusoma kwake ukitumia penseli kisha utie alama ya mkwaju (/) katika kila neno ambalo hakusoma vilivyo. Iwapo, mwanafunzi anajisahihisha, jibu hilo ni sahihi. Usiseme cho chote, isipokuwa wakati mwanafunzi atasita kwa muda wa sekunde 3 ambapo sasa utamsomea neno kisha umwonyeshe neno linalofuata na kumwambia “**Tafadhali endelea.**” Kwa kila neno unalomsomea mwanafunzi, tia alama ya kuonyesha hakupata jibu sahihi.

Baada ya sekunde 60 sema, “Acha kusoma.” Halafu tia alama ya mabano () katika neno la mwisho alilosoma.

Kanuni ya kusitisha kusoma mapema: Iwapo mwanafunzi hakusoma vilivyo maneno yote katika mstari wa kwanza, sema “**Asante!**”, sitisha shughuli hii, kisha utie alama katika kisanduku kilicho chini ya ukurasa huu na uendelee na sehemu inayofuata.

Sehemu ya Tatu (b). Kusoma na Kufahamu

Baada ya kukamilika kwa sekunde 60 au Iwapo mwanafunzi atamaliza kusoma hadithi, **IONDOE hadithi kutoka mbele ya mwanafunzi**, kisha uulize swali la kwanza hapa chini.

Mpe mwanafunzi hadi sekunde 15 alijibu swali, tia alama mwafaka kulingana na jibu lake, halafu uendelee katika swali linalofuata.

Soma maswali ya kila mstari hadi katika mabano yanayoonyesha mahala mwanafunzi alikomea kusoma.

HADITHI 2: KUSOMA	MASWALI	JIBU SAHIHI	JIBU LISILOSAHIHI	KUTOJIBU
Bahati anapenda kusoma. Yeye huamka asubuhi na mapema kwenda shule. 10	Bahati anapenda kufanya nini? [kusoma]			
Wazazi wake humwambia asome kwa bidii. Wao humnunulia penseli, vitabu na maandazi. 22	Wazazi humwambia Bahati afanye nini? [asome kwa bidiii]			
Bahati ni mtoto mzuri. Lakini siku moja, rafiki yake alimwambia wakaibe maembe kwa jirani. 37	Rafiki ya Bahati alimwambia nini? [Wakaibe maembe kwa jirani]			
Walipanda mwembe kwa ngazi. Jirani akaja. Aliwaambia washuke. 45	Walitumia nini kupanda mwembe? [Ngazi]			
Bahati na rafiki yake walishuka. Jirani aliwaeleza ubaya wa kuiba. Kisha akawasamehe. 57	Jirani aliwaeleza nini? [ubaya wa kuiba]			

Muda uliosalia katika saa ya kasi kufikia mwisho wa kusoma (idadi ya SEKUNDE):

Tia alama katika kisanduku hiki iwapo shughuli ya kusoma ilisitishwa kwa sababu mwanafunzi hakupata jawabu sahihi katika mstari wa kwanza.

Sehemu ya Nne (a): Kusoma Hadithi kwa Sauti

Muonyeshe mwanafunzi hadithi iliyomo katika kijitabu cha mwanafunzi. Halafu sema hivi,

Hii hapa ni hadithi fupi. Ningependa uisome kwa sauti, haraka lakini kwa makini. Ukimaliza kuisoma, nitakuuliza maswali kuhusu yale uliyosoma. Je, umeelewa jinsi unavyopaswa kufanya? Nikisema “Anza,” isome hadithi vizuri kadri ya uwezo wako. Nitanyamaza nikusilikilize. Uko tayari? Anza.

 Anzisha saa ya kupimia kasi pindi mwanafunzi asomapo neno la kwanza. Fuatilia kusoma kwake ukitumia penseli kisha utie alama ya mkwaju (/) katika kila neno ambalo hakisoma vilivyo. Iwapo, mwanafunzi anajisahihisha, jibu hilo ni sahihi. Usiseme cho chote, isipokuwa wakati mwanafunzi atasita kwa muda wa sekunde 3 ambapo sasa utamsomea neno kisha umwonyeshe neno linalofuata na kumwambia “**Tafadhali endelea.**” Kwa kila neno unalomsomea mwanafunzi, tia alama ya kuonyesha hakupata jibu sahihi.

Baada ya sekunde 180 sema, “Acha kusoma.” Halafu tia alama ya mabano () katika neno la mwisho alilosoma.

Kanuni ya kusitisha kusoma mapema: Iwapo mwanafunzi hakisoma vilivyo maneno yote katika mstari wa kwanza, sema “**Asante !**”, sitisha shughuli hii, kisha utie alama katika kisanduku kilicho chini ya ukurasa huu na uendelee na Sehemu inayofuata.

Sehemu ya Nne (b). Kusoma na Kufahamu

Baada ya kukamilika kwa sekunde 180 au Iwapo mwanafunzi atamaliza kusoma hadithi, **IONDOE hadithi kutoka mbele ya mwanafunzi**, kisha uulize swali la kwanza hapa chini.

Mpe mwanafunzi hadi sekunde 15 alijibu swali, tia alama mwafaka kulingana na jibu lake, halafu uendelee katika swali linalofuata.

Soma maswali ya kila mstari hadi katika mabano yanayoonyesha mahala mwanafunzi alikomea kusoma.

HADITHI 2: MASHINDANO YA MICHEZO	MASWALI	JIBU SAHIHI	JIBU LISILO SAHIHI	KUTOJIBU
Wasichana hupenda kuruka kamba. Nao wavulana hupenda mpira wa miguu. 10	Nani hupenda kucheza mpira wa miguu? [wavulana]			
Siku moja, wasichana wakaamua kucheza mpira wa miguu. Nao wavulana wakaruka kamba. 22	Je, wasichana waliamua kucheza nini? [mpira wa miguu]			
Lakini hakuna aliyecheza mchezo wao mpya vizuri. 29	Kwa nini wanafunzi hawakucheza vizuri mchezo huo mpya? [Hawakuwa wameuzoea, hawakuujua vizuri]			
Kuanzia siku hiyo, wakaamua kujifunza kucheza michezo mbalimbali. Si msichana, si mvulana. 41	Kwa nini wanafunzi waliamua kucheza michezo mbalimbali? [kuwa bora, kujifunza]			

Muda uliosalia katika saa ya kasi kufikia mwisho wa kusoma (idadi ya SEKUNDE):

Tia alama katika kisanduku hiki iwapo shughuli ya kusoma ilisitishwa kwa sababu mwanafunzi hakupata jawabu sahihi katika mstari wa kwanza.

Sehemu ya Tano (a): Kusoma Hadithi kwa Sauti

Muonyeshe mwanafunzi hadithi iliyomo katika kijitabu chako. Halafu sema hivi,

Hii hapa ni hadithi fupi. Nitaisoma kwa sauti. Nitaisoma mara moja tu. Halafu nitakuuliza maswali. Tafadhali sikiliza kwa makini kisha ujaribu kujibu maswali. Je, umeelewa jinsi unavyopaswa kufanya? Uko tayari? Naanza.

Sehemu hii haitapimwa muda.

Sehemu ya Tano (b). Kusoma na Kufahamu

Baada ya kusoma hadithi, muulize mwanafunzi maswali. Mpe mwanafunzi hadi sekunde 15 alijibu swali, tia alama mwafaka kulingana na jibu lake, halafu uendelee katika swali linalofuata.

Soma maswali ya kila mstari hadi mwisho.

HADITHI 2: NDOTO	MASWALI	JIBU SAHIHI	JIBU LISILOSAAHIHI	KUTOJIBU
Maria alienda kumtembelea nyanya. Akala ugali kwa samaki. Nyanya alimtandikia mkeka akalala. Maria akajikuta anapaa juu. Aliona miji mizuri iliyometameta kama nyota. Alipotua, akajikuta karibu na meza iliyojaa vyakula mbalimbali. Alinyoosha mkono kuchukua embe. Maria akasikia nyanya anamwita. Alipoamka, hakuona chakula chochote.	Maria alimtembelea nani? [nyanya]			
	Maria alitandikiwa nini cha kulalia? [mkeka]			
	Miji aliyoona Maria ilionekana je? [ilimetameta kama nyota, mizuri]			
	Ile meza aliyoiona Maria ilikuwa na nini? [Vyakula mbalimbali, maembe]			
	Hadithi uliyoisoma inahusu nini? [Ndoto ya Maria, likizo ya Maria, Likizo ya Disemba, Maria kamtembelea nyanya yake]			

Time Ended: ____:____ AM / PM

KENYA EARLY GRADE READING ASSESSMENT

Student Stimuli Booklet

Kiswahili

(Baseline)



Mifano: k A m

m a N O h a n U ng' A

l a gh K l R a u e i

Dh i a a m k A d i w

U n g k u g S A l a

n Ny Y e t n a l i N

a a z y h k V D b l

M a s sh o a i n m i

a A i l O B W Z p o

i t k L th a u E i T

A f i m e ch w u u n

Mifano: ju

huka

fisa

zefu

sine

chena

ngute

kuvi

ndweku

sharu

bwara

dusu

ndise

howe

ngiso

leye

gazu

honzi

kabe

hungu

vili

kenzi

regu

rime

rubwa

ripi

nziki

mwela

mapa

ndaho

nyuza

mbeta

nzinga

josa

mtofi

riki

vube

choyu

yota

vicha

msino

gowe

mwate

nepu

ndami

fipe

kengu

kine

shifi

chuso

toko

mtozo

hefa

Bahati anapenda kusoma. Yeye huamka asubuhi na mapema kwenda shule. Wazazi wake humwambia asome kwa bidii. Wao humnunulia penseli, vitabu na maandazi. Bahati ni mtoto mzuri. Lakini siku moja, rafiki yake alimwambia wakaibe maembe kwa jirani. Walipanda mwembe kwa ngazi. Jirani akaja. Aliwaambia washuke. Bahati na rafiki yake walishuka. Jirani aliwaeleza ubaya wa kuiba. Kisha akawasamehe.

Wasichana hupenda kuruka kamba. Nao wavulana hupenda mpira wa miguu. Siku moja, wasichana wakaamua kucheza mpira wa miguu. Nao wavulana wakaruka kamba. Lakini hakuna aliyecheza mchezo wao mpya vizuri. Kuanzia siku hiyo, wakaamua kujifunza kucheza michezo mbalimbali. Si msichana, si mvulana.

Kenya Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Baseline)

ENGLISH

General Instructions

It is important to establish a playful and relaxed rapport with the children to be assessed, via some simple initial conversation among topics of interest to the child (see example below). The child should perceive the following assessment almost as a game to be enjoyed rather than an exam. It is important to read ONLY the sections in boxes aloud slowly and clearly.

Good morning. My name is ____ and I live in _____. I'd like to tell you a little bit about myself. [Number and ages of children; pets; sports; etc]

1. Could you tell me a little about yourself and your family? [Wait for response; if student is reluctant, ask question 2, but if they seem comfortable continue to verbal consent].

2. What do you like to do when you are not in school?

Verbal Consent

- Let me tell you why I am here today. I work with the Ministry of Education and we are trying to understand how children learn to read. You were picked by chance, like in a raffle or lottery.
- We would like your help in this. But you do not have to take part if you do not want to.
- We are going to play a reading game. I am going to ask you to read letters, words and a short story out loud.
- Using this stopwatch, I will see how long it takes you to read.
- This is NOT a test and it will not affect your grade at school.
- I will also ask you other questions about your family, like what language your family uses at home and some of the things your family has.
- I will NOT write down your name so no one will know these are your answers.
- Once again, you do not have to participate if you do not wish to. Once we begin, if you would rather not answer a question, that's all right.
- Do you have any questions? Are you ready to get started?

Check box if verbal consent is obtained: **YES**

(If verbal consent is not obtained, thank the child and move on to the next child, using this same form)

A. Date of Assessment :	Day : _____ Month: _____
B. Enumerator's Name :	
C. School Name :	
D. District:	
E. Zone:	
F. School Shift :	1 = Full day 2 = Morning only 3 = Afternoon only
G. Multigrade Class ?	0 = No 1 = Yes
H. Order of Assessment	1 = First 2 = Second 3 = Third

I. Class:	1 = Class One 2 = Class two
J. Stream Name:	
K. Pupil Unique Code:	
L. Student's Age :	
M. Student's Gender	1 = boy 2 = girl
N. Time Started:	____ : ____ AM / PM

Section 1. Letter Sound Knowledge

Show the child the sheet of letters in the student stimuli booklet. Say:

Here is a page full of letters of the English alphabet. Please tell me the SOUNDS of as many letters as you can; not the NAMES of the letters, but the SOUNDS.

For example, the sound of this letter [point to A] is "AH" as in "APPLE".

Let's practise: Tell me the sound of this letter [point to V]:

If the child responds correctly say: Good, the sound of this letter is "VVVV."

If the child does not respond correctly, say: The sound of this letter is "VVVV."

Now try another one: Tell me the sound of this letter [point to L]:

If the child responds correctly say: Good, the sound of this letter is "LLL."

If the child does not respond correctly, say: The sound of this letter is "LLL."

Do you understand what you are to do?

When I say "Begin," please sound out the letters as quickly and carefully as you can. Tell me the sound of the letters, starting here and continuing this way. [Point to the first letter on the row after the example and draw your finger across the first line]. If you come to a letter sound you do not know, I will tell it to you. If not, I will keep quiet and listen to you. Ready? Begin.



Start the timer when the child reads the first letter. Follow along with your pencil and **clearly** mark any incorrect letters with a slash (/). Count self-corrections as correct. If you've already marked the self-corrected letter as incorrect, circle the letter and go on. **Stay quiet**, except when providing answers as follows: if the child hesitates for 3 seconds, provide the sound of the letter, point to the next letter and say "**Please go on.**" Mark the letter you provide to the child as incorrect. If the student gives you the letter name, rather than the sound, provide the letter sound and say: ["**Please tell me the SOUND of the letter**"]. This prompt may be given only once during the exercise.

AFTER 60 SECONDS SAY, "stop." Mark the final letter read with a bracket (]).

Early Stop Rule: If you have marked as incorrect all of the answers on the first line with no self-corrections, say "**Thank you!**" discontinue this exercise, check the box at the bottom, and go on to the next exercise.

Example : A v L

1	2	3	4	5	6	7	8	9	10	
e	f	d	R	m	i	w	r	i	H	(10)
o	n	F	a	e	A	t	T	e	y	(20)
n	G	W	o	C	t	i	H	e	o	(30)
r	E	s	Y	n	U	S	t	s	e	(40)
D	t	l	o	t	p	l	i	s	g	(50)
L	N	l	E	l	x	k	r	z	A	(60)
n	w	a	O	H	e	P	d	t	s	(70)
s	o	E	h	e	m	a	M	b	E	(80)
J	r	c	s	v	h	R	u	B	a	(90)
u	E	Q	N	a	T	l	h	A	O	(100)

Time remaining on stopwatch at completion (number of SECONDS) :

Check this box if the exercise was discontinued because the child had no correct answers in the first line.

Section 2. Invented word decoding

Show the child the sheet of invented words in the student stimuli booklet. Say,

Here are some made-up words. I would like you to read as many as you can. Do not spell the words, but read them. For example, this made-up word is: “ut”.

Let’s practise: Please read this word [point to the next word: dif].

[If the student says “dif”, say]: “Very good: “dif”

[If the student does not say “dif” correctly say]: This made-up word is “dif.”

Now try another one: Please read this word [point to the next word: mab].

[If the student says “mab”, say]: “Very good: “mab”

[If the student does not say “mab” correctly say]: This made-up word is “mab.”

When I say “begin,” read the words as quickly and carefully as you can. Read the words across the page, starting at the first row below the line. I will keep quiet and listen to you, unless you need help. Do you understand what you are to do? Ready? Begin.



Start the timer when the child reads the first word. Follow along with your pencil and clearly mark any incorrect words with a slash (/). Count self-corrections as correct. If you’ve already marked the self-corrected word as incorrect, circle the word and go on. **Stay quiet**, except when providing answers as follows: if the child hesitates for 3 seconds, provide the word, point to the next word and say “Please go on.” Mark the word you provide to the child as incorrect.

AFTER 60 SECONDS, SAY “Stop.” Mark the final word read with a bracket (]).

Early Stop Rule: If you have slashed/marked as incorrect all of the answers on the first line, say “Thank you!” discontinue this exercise, check the box at the bottom, and go on to the next exercise.

Example : ut dif mab

1	2	3	4	5	
vob	tep	reb	fem	bis	(5)
zay	yut	gux	pef	het	(10)
raz	mak	mip	lep	sab	(15)
vap	zin	jif	pab	ruk	(20)
wis	zeg	mep	jol	pos	(25)
yot	wog	bem	kar	heg	(30)
jeb	pog	dix	fik	dap	(35)
rov	wim	kom	gat	cur	(40)
pim	pug	daf	lal	laj	(45)
noz	zil	fal	mof	lop	(50)

Time remaining on stopwatch at completion (number of SECONDS) :

Check this box if the exercise was discontinued because the child had no correct answers in the first line.

Section 3a. Oral passage reading

Show the child the story in the student stimuli booklet. Say,

Here is a short story. I want you to read it aloud, quickly but carefully. When you have finished, I will ask you some questions about what you have read. Do you understand what you are to do? When I say “begin,” read the story as best as you can. I will keep quiet & listen to you, unless you need help. Ready? Begin.



Start the timer when the child reads the first word. Follow along with your pencil and clearly mark any incorrect words with a slash (/). Count self-corrections as correct. **Stay quiet**, unless the child hesitates for 3 seconds, in which case provide the word, point to the next word and say “**Please go on.**” Mark the word you provide to the child as incorrect. **At 60 seconds, say “Stop.” Mark the final word read with a bracket ()**. **Early stop rule:** If the child reads no words correctly on the first line, say “**Thank you!**”, discontinue this exercise, check the box at the bottom of the page, and go on to the next exercise.

Section 3b. Reading comprehension

When 60 seconds are up or if the child finishes reading the passage in less than 60 seconds, **REMOVE the passage from in front of the child**, and ask the first question below.

Give the child at most 15 seconds to answer the question, mark the child’s response, and move to the next question.

Read the questions for each line up to the bracket showing where the child stopped reading.

Now I am going to ask you a few questions about the story you just read. Try to answer the questions as well as you can.

Story 1: WHERE IS SARA’S SWEATER	QUESTIONS	CORRECT RESPONSE	INCORRECT RESPONSE	NO RESPONSE
One day, Sara lost her sweater. She was worried. It was very cold. 13	What did Sara lose? [Sara lost her sweater.]			
She looked in her desk and on her seat. The sweater was not there. 27	Where did Sara look for her sweater? [in the desk, seat, classroom, under the big tree; playground]			
She ran to the playground. She looked under the big tree. It was not there. 42	Where did Sara run? [the playground]			
She told her teacher she had lost her sweater. The teacher pointed to Sara’s neck. Sara laughed. 59	Where was Sara’s sweater? [On/around her neck, on her body]			
	Why did Sara laugh? [Because the sweater was on her neck]			

Time remaining on stopwatch at completion (number of SECONDS):

Check this box if exercise stopped due to no correct answers in the first line.

Section 4a. Oral Passage Reading (Untimed)

Show the child the story in the student stimuli booklet. Say,

Here is a short story. I want you to read it aloud, quickly but carefully. When you have finished, I will ask you some questions about what you have read. Do you understand what you are to do? When I say “begin,” read the story as best as you can. I will keep quiet & listen to you, unless you need help. Ready? Begin.



Start the timer when the child reads the first word. Follow along with your pencil and clearly mark any incorrect words with a slash (/). Count self-corrections as correct. **Stay quiet**, unless the child hesitates for 3 seconds, in which case provide the word, point to the next word and say “**Please go on.**” Mark the word you provide to the child as incorrect.

At 180 seconds, say “**Stop.**” Mark the final word read with a bracket ().

Early Stop Rule: If the child reads no words correctly on the first line, say “**Thank you!**” Discontinue this exercise, check the box at the bottom of the page, and go on to the next exercise.

Section 4b. Reading Comprehension

When 180 seconds are up or if the child finishes reading the passage in less than 180 seconds, **REMOVE the passage from in front of the child**, and ask the first question below.

Give the child at most 15 seconds to answer the question, mark the child’s response, and move to the next question.

Read the questions for each line up to the bracket showing where the child stopped reading.

Now I am going to ask you a few questions about the story you just read. Try to answer the questions as well as you can.

Story 1: School Dance	QUESTIONS	CORRECT RESPONSE	INCORRECT RESPONSE	NO RESPONSE
Moraa and her friends are going to dance for their school. 11	What are the girls going to do? (To dance at school, dance, dance for school)			
They want to be the best dancers. They practice every day. 22	Why do they practice every day? (they want to be the best, to improve, get better)			
When the girls dance, the whole school claps. Moraa and her friends know they shall win. 38	What does the whole school do when Moraa and her friends dance? (The whole school/everyone claps)			
	Why does the whole school clap? (The girls dance well; They were happy with the dancers.)			

Time remaining on stopwatch at completion (number of SECONDS):

Check this box if exercise stopped due to no correct answers in the first line.

Section 5. Pupil Context Interview

Ask each question verbally to the child, as in an interview. Do not read the response options aloud. Wait for the child to respond, then write this response in the space provided, or circle the code of the option that corresponds to the child's response. If there is no special instruction to the contrary, only one response is permitted.

1a	Do you speak the same language at home as you speak at school?	No, Go to 1b..... 0 Yes 1 Do not know/No response.....9			
1b	[If "No" to Question 1a], What language do you speak at home? <i>[Multiple responses are allowed]</i>	Kiswahili 1 English..... 2 Mother Tongue.....3 (Specify):..... Do not know/No response.....9			
At your house, do you have:		No	Yes	Don't Know	No response
2	a radio ?	0	1	8	9
3	a telephone or mobile phone?	0	1	8	9
4	electricity ?	0	1	8	9
5	a television?	0	1	8	9
6	a refrigerator?	0	1	8	9
7	a toilet inside the house ?	0	1	8	9
8	a bicycle ?	0	1	8	9
9	a motorcycle ?	0	1	8	9
10	a car, truck, 4 by 4, tractor, or engine boat ?	0	1	8	9
11	Did you go to a nursery or pre-school before Class 1?	No 0 Yes 1 Do not know/No response.....9			
12	What class were you in last year?	Pre-school..... 0 Class 1 1 Class 2.....2 Not in school 3 Do not know/No response.....9			

13	Last year, were you absent from school for more than one week?	No 0 Yes 1 Do not know/No response.....9
14	Do you have the English reading textbook?	No 0 Yes 1 Do not know / No response 9
15	Do you have the Kiswahili reading textbook?	No 0 Yes 1 Do not know / No response 9
16	Do you have the maths textbook?	No 0 Yes 1 Do not know / No response 9
17	Do you have books or reading materials at home? <i>[If No or Don't Know Skip to 19]</i>	No 0 Yes 1 Do not know / No response 9
18	<i>[If yes to Question 17]</i> What language(s) are these books or other materials in? <i>[Multipl- responses are allowed]</i>	Kiswahili.....1 English 2 Mother Tongue.....3 (Specify):..... Do not know / No response 9
19	Can your mother read and write?	No 0 Yes 1 Do not know / No response 9
20	Can your father read and write?	No 0 Yes 1 Do not know / No response 9

OK we are done! You have done a good job. Go back to your classroom, and please do not talk to other pupils about what we have done today.

Time Ended: ____ : ____ AM / PM

KENYA EARLY GRADE READING ASSESSMENT

Student Stimuli Booklet English

BASELINE



Example : A v L

e f d R m i w r i H

o n F a e A t T e Y

n G W o C t i H e O

r E s Y n U S t s e

D t l o t p l i s g

L N l E l x k r z A

n w a O H e P d t s

s o E h e m a M b E

J r c s v h R u B a

u E Q N a T l h A O

Example : ut dif mab

vob tep reb fem bis

zay yut gux pef het

raz mak mip lep sab

vap zin jif pab ruk

wis zeg mep jol pos

yot wog bem kar heg

jeb pog dix fik dap

rov wim kom gat cur

pim pug daf lal laj

noz zil fal mof lop

One day, Sara lost her sweater. She was worried. It was very cold. She looked in her desk and on her seat. The sweater was not there. She ran to the playground. She looked under the big tree. It was not there. She told her teacher she had lost her sweater. The teacher pointed to Sara's neck. Sara laughed.

Moraa and her friends are going to dance for their school. They want to be the best dancers. They practice every day. When the girls dance, the whole school claps. Moraa and her friends know they shall win.



**Kenya Early Grade Mathematics Assessment: Student Response Form
Administrator Instructions and Protocol, 2012**

MATHEMATICS (Baseline Survey)

General Instructions

It is important to establish a playful and relaxed rapport with the children to be assessed, via some simple initial conversation among topics of interest to the child. The child should perceive the following assessment almost as a game to be enjoyed rather than a severe situation. It is important to read **ONLY** the sections in boxes aloud slowly and clearly.

Verbal Consent: Read the text in the box clearly to the child in Kiswahili or English:

Before we start, I want to tell you my name. I'm _____
Kabla ya kuanza, ningependa kukueleza majina yangu. Mimi naitwa _____

I work with the Ministry of Education. Kiswahili: Mimi hufanya kazi na Wizara ya Elimu.

- **We want to know how children learn math. You were picked by chance, like in a raffle or lottery.**
Kiswahili: Tungependa kujua vile watoto wanajivunza hesabu. Kuchaguliwa kwako kulikuwa ni bahati tu, kama mchezo wa bahati na sibu
- **We would like your help in this. But you do not have to take part if you do not want to.**
Kiswahili: Tungepedelea usaidizi wako katika haya. Lakini si lazima ushiriki ikiwa hupendelei.
- **We are going to play some counting games and some number games. Kiswahili: Tutacheza michezo ya kuhesabu na pia michezo ya nambari.**
- **Using this stopwatch, I will see how long it takes you to count.**
Kiswahili: Kwa kutumia saa hii, nitaweza kuona itakuchukua mda gani kuhesabu.
- **This is NOT a test and you will NOT be graded on it for school.**
Kiswahili: Huu sio mtihani na hautatahiniwa shuleni.
- **I will NOT write down your name so no one will know these are your answers.**
Kiswahili: Sitayaandika majina yako kwa hivyo hakuna mtu atakayejua yakwamba haya ni majibu yako.
- **Once again, you do not have to take part in this if you do not want to. Once we begin, if you do not want to answer a question, that's all right.**
Kwa mara nyingine, si lazima ushiriki iwapo hujihisi. Tukisha anza, unauhuru wakutojibu swali lolote.

Okay, are you ready to start? Kiswahili: Je, uko tayari kuanza?

Check box if verbal consent is obtained: **YES**

(If verbal consent is not obtained, thank the child and move on to the next child, using this same form)

A. Date of Assessment :	Day : _____ Month: _____
B. Enumerator's Name :	
C. School Name :	
D. District:	
E. Zone:	
F. School Shift :	1 = Full day 2 = Morning only 3 = Afternoon only
G. Multigrade Class ?	0 = No 1 = Yes
H. Order of Assessment	1 = First 2 = Second 3 = Third

I. Class:	1 = Class One 2 = Class two
J. Stream Name:	
K. Pupil Unique Code:	
L. Student's Age :	
M. Student's Gender	1 = boy 2 = girl
N. Time Started:	____ : ____ AM / PM

Task 1: Rational Counting - PRACTICE	📖 Sheet 1A	🕒 × (Not Timed)
<p>🗣️ Here are some circles. <i>Kiswahili: Hapa pana duara (mviringo) kadhaa.</i> I want you to point at the circle as you count loudly. <i>Kiswahili: Nataka uonyeshe kila Duara kwa kidole ukizihesabu kwa sauti.</i> Start here and count the circles: one ... <i>Kiswahili: Anzia hapa na uhesabu duara: moja ...</i></p> <p>🗣️ How many circles did you count? <i>Kiswahili: Je, umehesabu duara ngapi?</i></p> <p>✓ 🗣️ That's correct. There are three circles. <i>Kiswahili: Ndivyo! Pana duara tatu.</i></p> <p>× 🗣️ Watch me count the circles. <i>Kiswahili: Nitazame nikihesabu duara.</i> One, two, three. There are three circles. <i>Kiswahili: Moja, mbili, tatu. Pana duara tatu.</i> I want you to point at the circle as you count loudly. <i>Kiswahili: Nataka uonyeshe kila duara kwa kidole ukizihesabu kwa sauti.</i></p> <p>🗣️ Let us count some more circles now: <i>Kiswahili: Hebu tuhezabu duara zingine sasa:</i></p>		

Task 1: Rational Counting - EXERCISE	📖 Sheets 1B	🕒 60 sec limit (Timed)
<p>🗣️ Here are some circles. <i>Kiswahili: Hapa pana duara (mviringo) kadhaa.</i> I want you to point at the circle as you count loudly. <i>Kiswahili: Nataka uonyeshe kila Duara kwa kidole ukizihesabu kwa sauti.</i> Start here and count as many circles as you can: one ... <i>Kiswahili: Anzia hapa na uhesabu duara zote kadiri uwezavyo: moja...</i></p>		<p>🛑 (Stop)</p> <ul style="list-style-type: none"> • If child makes an error • If time reaches 60 sec.
✍️ Write the number of the last circle counted correctly:	_____ Circles	
<p>🗣️ How many circles did you count? <i>Kiswahili: Je, umehesabu duara ngapi?</i></p>		
✍️ Write the number of circles that the child says he or she counted:	_____ Circles	

Task 2: Number Identification - EXERCISE

📖 Sheet 2

🕒 60 seconds (Timed)

🗣️ Here are some numbers. I want you to point to each number and tell me what the number is. I am going to time you and will tell you when to begin and when to stop.

Kiswahili: Hapa pana nambari kadhaa. Nataka uonyeshe kila nambari kwa kidole na uniambie ni nambari gani. Nitakuhesabia wakati, nitakueleza wakati wa kuanza na wa kumalizia

- **[Point to the first number] Start here. [Glide hand from left to right]. Are you ready? . . . Start.**

Kiswahili: [Onyesha nambari ya kwanza kwa kidole] Anza hapa. [Teleza mkono kutoka upande wa kushoto hadi wa kulia]. Je, uko tayari?... Anza.

- **What number is this?**

Kiswahili: Hii ni nambari gani?

✂️ (/) Incorrect or no response

() After the last number read

2	9	0	12	30
22	45	39	23	48
91	33	74	87	65
108	245	587	731	989

👋 (Stop)

• If the time on the stopwatch runs out (60 seconds).

➡️ (Move on)

• If a child stops on a number for 5 **SECONDS**, mark as wrong and move on.

✂️ Record time left (seconds):

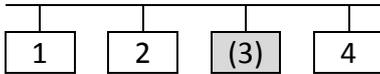
Task 3: Number Discrimination - PRACTICE	Sheet 3A	⌚ × (Not Timed)
<p>P1:</p> <p>👂 Look at these numbers. Tell me which number is bigger. <i>Kiswahili: Tazama nambari hizi. Niambie ni namabari gani kubwa?</i> 8 4</p> <p>✓👂 That's correct, 8 is bigger. Let's do another one. <i>Kiswahili: Sahihi! 8 ndio kubwa. Tujaribu mfano mwingine.</i></p> <p>✗👂 The bigger number is 8. [Point to 8]: This is 8. [Point to 4]: this is 4. 8 is bigger than 4. Let's do another one. <i>Kiswahili : Nambari kubwa ni 8.[elekeza kidole kwa kwa 8]. Hii ni 8. . [elekeza kidole kwa 4]. Hii ni 4. '8' ni kubwa kuliko '4'. Tujaribu mfano mwingine.</i></p>		
<p>P2:</p> <p>👂 Look at these numbers. Tell me which number is bigger. <i>Kiswahili: Tazama nambari hizi. Niambie ni nambari gani kubwa?</i> 12 22</p> <p>✓👂 That's right, 22 is bigger. Let's continue. <i>Kiswahili: Ndivyo! 22 ni kubwa. Ebu tuendelee.</i></p> <p>✗👂 The bigger number is 22. [Point to 22]: This number is 22. [Point to 12]: This is 12. 22 is bigger than 12. Let's continue. <i>Kiswahili : Nambari kubwa ni 22. [Elekeza kidole kwa 22]. Hii ni 12. [Elekeza kidole kwa 12]. 22 ni kubwa kuliko 12. Hebu tuendelee.</i></p>		

Task 3: Number Discrimination - EXERCISE	Sheets 3B1 & 3B2	⌚ × (Not Timed)																																																		
<p>👂 Look at these numbers. Tell me which number is bigger. <i>Kiswahili: Tazama nambari hizi. Nieleze ni nambari gani kubwa kuliko nyingine.</i> [Repeat for each item]</p>		<p>👋 (Stop)</p> <ul style="list-style-type: none"> •If the child makes 4 successive errors 																																																		
<p>✂ Circle: 1 = Correct 0 = Incorrect or no response.</p> <table border="1" data-bbox="156 1473 922 1749"> <tbody> <tr> <td>7</td><td>5</td><td><u>7</u></td><td>1</td><td>0</td> <td>94</td><td>78</td><td><u>94</u></td><td>1</td><td>0</td> </tr> <tr> <td>11</td><td>24</td><td><u>24</u></td><td>1</td><td>0</td> <td>146</td><td>153</td><td><u>153</u></td><td>1</td><td>0</td> </tr> <tr> <td>39</td><td>23</td><td><u>39</u></td><td>1</td><td>0</td> <td>287</td><td>534</td><td><u>534</u></td><td>1</td><td>0</td> </tr> <tr> <td>58</td><td>49</td><td><u>58</u></td><td>1</td><td>0</td> <td>623</td><td>632</td><td><u>632</u></td><td>1</td><td>0</td> </tr> <tr> <td>65</td><td>67</td><td><u>67</u></td><td>1</td><td>0</td> <td>867</td><td>965</td><td><u>965</u></td><td>1</td><td>0</td> </tr> </tbody> </table>		7	5	<u>7</u>	1	0	94	78	<u>94</u>	1	0	11	24	<u>24</u>	1	0	146	153	<u>153</u>	1	0	39	23	<u>39</u>	1	0	287	534	<u>534</u>	1	0	58	49	<u>58</u>	1	0	623	632	<u>632</u>	1	0	65	67	<u>67</u>	1	0	867	965	<u>965</u>	1	0	<p>➡ (Move on)</p> <ul style="list-style-type: none"> •If the child doesn't respond after <u>5 SECONDS</u>, mark as <u>wrong and move on.</u>
7	5	<u>7</u>	1	0	94	78	<u>94</u>	1	0																																											
11	24	<u>24</u>	1	0	146	153	<u>153</u>	1	0																																											
39	23	<u>39</u>	1	0	287	534	<u>534</u>	1	0																																											
58	49	<u>58</u>	1	0	623	632	<u>632</u>	1	0																																											
65	67	<u>67</u>	1	0	867	965	<u>965</u>	1	0																																											

P1:

🧠 Here are some numbers. 1, 2, and 4, what number goes here?

Kiswahili: Hapa pana nambari kadhaa. 1, 2 na 4. Ni nambari gani itaekwa hapa?



✓🧠 That's correct, 3. Let's do another one.

Kiswahili: Ndivyo, 3! Tujaribu mfano mwingine.

✗🧠 The number three goes here. Say the numbers with me. [Point to each number] 1, 2, 3, 4. 3 goes here. Let's do another one.

Kiswahili: Namabari 3 itaekwa hapa. Tuseme nambari hizi pamoja. [Elekeza kidole kwa kila nambari]. 1, 2, 3, 4. Namabari 3 itaekwa hapa. Tujaribu mfano mwingine.

P2:

🧠 Here are some numbers. 5, 10, and 15, what number goes here?

Kiswahili: Hapa pana nambari kadhaa: 5, 10 na 15. Ni nambari gani itaenda hapa?



✓🧠 That's correct, 20. Let's do some more.

Ndivyo, 20! Tujaribu mifano zaidi.

✗🧠 The number 20 goes here. Say the numbers with me. [Point to each number] 5, 10, 15, 20. 20 goes here. Let's do some more.

Kiswahili: Namabari 20 itaekwa hapa. Tuseme nambari hizi pamoja [elekeza kidole kwa kila nambari]. 5,10,15,20. 20 inaekwa hapa. Tujaribu mifano zaidi.

Task 4: Missing number - EXERCISE

📖 Sheets 4B1 & 4B2

⌚ × (Not Timed)

👁️ Here are some more numbers. [Point to the box] . . . What number goes here?

Kiswahili: Hapa pana nambari zaidi. [elekeza kidole kwa sanduku] ... Ni nambari gani itaenda hapa?

[Repeat for each item]

✍️ **Circle:** 1 = Correct.
0 = Incorrect or no response.

1		6		1	0	1	0
2		7		1	0	1	0
3		8		1	0	1	0
4		9		1	0	1	0
5		10		1	0	1	0

- 👁️ (Stop)
- If the child gets 4 successive errors
- ➡️ (Move on)
- If the child doesn't respond after 5 SECONDS, mark as wrong and move on.

Task 5A: Addition: Level 1 - EXERCISE

 **Sheets 5A1 & 5A2**

 **60 seconds (Timed)**

 **Here are some addition exercises [glide hand from top to bottom]. I am going to time you and will tell you when to begin and when to stop. Say the answer for each problem. If you don't know an answer, move to the next problem. Are you ready? . . .**

Kiswahili: Hapa kuna zoezi la kuongeza. [Pitisha mkono kutoka juu hadi

chini] . Nitakuhesabia wakati na nitakuambia wakati wakuanza na wakati wakumaliza. Sema jawabu kwa kila swali. Kama hauna jibu, endelea na swali linalofuatia. Je, uko Tayari? . . .

Start here [point to the first problem].

Kiswahili: Anzia hapa [elekeza kidole kwa swali la kwanza]

 (Stop)

- If the time on the stopwatch runs out (60 seconds).

 (Move on)

- If a child stops on an item for **5 SECONDS**, mark as wrong and move on.

 (/) Incorrect or no response

(]) After last problem attempted

$1 + 3 = (4)$	$7 + 8 = (15)$
$2 + 3 = (5)$	$4 + 7 = (11)$
$6 + 2 = (8)$	$7 + 5 = (12)$
$4 + 5 = (9)$	$8 + 6 = (14)$
$3 + 3 = (6)$	$9 + 8 = (17)$
$8 + 1 = (9)$	$6 + 7 = (13)$
$7 + 3 = (10)$	$8 + 8 = (16)$
$3 + 9 = (12)$	$8 + 5 = (13)$
$2 + 8 = (10)$	$10 + 2 = (12)$
$9 + 3 = (12)$	$8 + 10 = (18)$

 Record time left (seconds):

To solve the problems, indicate the method the child used (tick all that apply):

- Solved the problems in his/her head
- Fingers
- Counters
- Tick marks on paper with a pencil
- Other ( describe) _____

  Paper and pencil.

 **Here are more addition exercises.**
You may use this paper and pencil if you want to. But you do not have to do so.

Kiswahili: Hapa kuna mazoezi mengine ya kuongeza. Ukipenda, waweza kutumia penseli na karatasi Lakini sio lazima. .

Start here [point to the first problem].

Kiswahili: Anzia hapa [elekeza kidole kwa tatizo la kwanza]

 **Circle:** 1 = Correct.
 0 = Incorrect or no response.

13 + 6 = (19) 1 0

18 + 7 = (25) 1 0

12 + 14 = (26) 1 0

22 + 37 = (59) 1 0

38 + 26 = (64) 1 0

 (stop)

• If the child did not answer any Level 1 question correctly.

• If the child makes 4 consecutive errors.

 (Move on)

• If a child uses an inefficient strategy (e.g., tick marks), ask the child “Do you know another way to solve the problem?”

• If a child continues to use an inefficient strategy or stops on an item **for 5 SECONDS.**

To solve the problems, the child used [(✓) tick all that apply]:

- Solved the problems in his/her head
- Fingers
- Counters
- Tick marks on paper with a pencil
- Other ( describe) _____

Task 6A: Subtraction: Level 1 - - EXERCISE

 **Sheets 6A1 & 6A2**

 **60 seconds (Timed)**

 **Here are some subtraction exercises [glide hand from top to bottom]. I am going to time you and will tell you when to begin and when to stop. Say the answer for each problem. If you don't know an answer, move to the next problem. Are you ready? . . .**

Kiswahili: Hapa kuna zoezi la kutoa [elekeza mkono kutoka juu hadi chini]. Nitakuhesabia wakati na nitakuambia wakati wakuanza na wakati wakumaliza. Sema jawabu kwa kila swali. Kama hauna jawabu, enda kwa tatizo linalofuatia. Je, uko Tayari? . . .

Start here [point to the first problem].

Kiswahili: Anzia hapa [elekeza kidole kwa tatizo la kwanza]

 (Stop)

• If the time on the stopwatch runs out (60 seconds).

 (Move on)

• If a child stops on an item for **5 SECONDS**, mark as wrong and move on.

 (/) Incorrect or no response
() After last problem attempted

$4 - 3 = (1)$	$15 - 8 = (7)$
$5 - 3 = (2)$	$11 - 7 = (4)$
$8 - 2 = (6)$	$12 - 5 = (7)$
$9 - 5 = (4)$	$14 - 6 = (8)$
$6 - 3 = (3)$	$17 - 8 = (9)$
$9 - 1 = (8)$	$13 - 7 = (6)$
$10 - 3 = (7)$	$16 - 8 = (8)$
$12 - 9 = (3)$	$13 - 5 = (8)$
$10 - 8 = (2)$	$12 - 2 = (10)$
$12 - 3 = (9)$	$18 - 10 = (8)$

 Record time left (seconds):

To solve the problems, the child used [(✓)tick all that apply]:

- Solved the problems in his/her head
- Fingers
- Counters
- Tick marks on paper with a pencil
- Other ( describe) _____

Task 6B: Subtraction: Level 2 - EXERCISE	Sheet 6B	⌚ × (Not Timed)
✎ Paper and pencil.		👋 (Stop)
<p>💡 Here are more subtraction exercises. You may use this paper and pencil if you want to. You do not have to do so. <i>Kiswahili: Hapa kuna zoezi lingine la kutoa. Ukipenda, waweza kutumia penseli na karatasilakini sio lazima..</i></p> <p>Start here [point to first problem]. <i>Kiswahili: Anzia hapa [elekeza kidole kwa swali la kwanza]</i></p>		<ul style="list-style-type: none"> • If the child did not answer any Level 1 question correctly. • If the child makes 4 consecutive errors.
<p>✂ Circle: 1 = Correct. 0 = Incorrect or no response.</p> <p>19 – 6 = (13) <input type="checkbox"/> 1 <input type="checkbox"/> 0</p> <p>25 – 7 = (18) <input type="checkbox"/> 1 <input type="checkbox"/> 0</p> <p>26 – 14 = (12) <input type="checkbox"/> 1 <input type="checkbox"/> 0</p> <p>59 – 37 = (22) <input type="checkbox"/> 1 <input type="checkbox"/> 0</p> <p>64 – 26 = (38) <input type="checkbox"/> 1 <input type="checkbox"/> 0</p>		<p>➡ (Move on)</p> <ul style="list-style-type: none"> • If a child uses an inefficient strategy (e.g., tick marks), ask the child “Do you know another way to solve the problem?” • If a child continues to use an inefficient strategy or stops on an item for 5 SECONDS.
<p>To solve the problems, the child used [(✓)tick all that apply]:</p> <p><input type="checkbox"/> Solved the problems in his/her head</p> <p><input type="checkbox"/> Fingers</p> <p><input type="checkbox"/> Counters</p> <p><input type="checkbox"/> Tick marks on paper with a pencil</p> <p><input type="checkbox"/> Other (🗨 describe) _____</p>		

✎ ✦ Counters, paper and pencil.

🗣️ I have some exercises that I am going to ask you to do for me. Here are some objects to help you. You can use them if you need them, but you don't have to use them. Listen very carefully to each exercise. If you need, I will repeat the exercise for you. Okay, let's get started.

Kiswahili: Hapa ninao mazoezi zaidi ambalo nitakuuliza ufanye. Hapa pana vyombo kadhaa vya kukusaidia. Ukitaka, waweza kuvitumia lakini sio lazima uvitumie. Sikiliza kwa makini kwa kila zoezi. Ukitaka nirudie, nikotayari kufanya hivyo. Sawa! Hebu tuanze.

🗣️ There are three children in the matatu.

One child gets out of the matatu.

How many children are left in the matatu?

Kiswahili: Pana watoto watatu ndani ya matatu.

Mtoto mmoja anatoka nje ya matatu.

Je, ni watoto wangapi wamebaki ndani ya matatu?

✓ 🗣️ That's right. There are two children left in the matatu. Let's do some more.

Kiswahili: Ndivyo; watoto wawili wamebaki ndani ya matatu. Hebu tufanye mazoezi zaidi.

✎ 🗣️ Imagine these counters are children [*point to counters*]. Count out three children. These children are in the matatu. One child gets out of the matatu. Using the counters, show me one child getting out of the matatu. How many children are left in the matatu? That's right. There are two children left in the matatu. Let's do some more.

Kiswahili: Chukulia hivi vihesabio ni watoto [elekeza kidole kwa vihesabio]. Hesabu watoto watatu. Hawa watoto wako ndani ya matatu. Mtoto mmoja anatoka nje ya matatu. Ukitumia vihesabio, nionyeshe mtoto mmoja akitoka nje ya matatu. Je, ni watoto wangapi wamebaki ndani ya matatu? Ndivyo; watoto wawili wamebaki ndani ya matatu. Ebu tufanye mazoezi zaidi.

Task 7: Word Problems - EXERCISE		📖 × (No Stimuli Sheet)	🕒 × (Not Timed)
✎ ✦ Counters, paper and pencil.			
<p>🧠 Now I have some more exercises for you. <i>Kiswahili: Sasa ninayo mazoezi zaidi ambayo ningetaka ufanye.</i></p>		<p>🛑 (Stop)</p> <ul style="list-style-type: none"> • If the child gets 4 successive errors 	
<p><u>Exercise 1</u></p> <p>🧠 2 children are on the matatu. [pause and check] 3 more children get on. [pause and check] How many children are on the matatu altogether?</p> <p><i>Kiswahili: Watoto wawili wako ndani ya matatu [pumziko]. Watoto wengine watatu wanaingia ndani ya matatu [pumziko]. Je, ni watoto wangapi sasa wako ndani ya matau kwa jumla?</i></p>	<p>Correct answer: 5 <u>Circle one:</u></p> <p><input type="checkbox"/> 1 Correct <input type="checkbox"/> 0 Incorrect</p>	<p>➡ (Move on)</p> <ul style="list-style-type: none"> • If a child stops on an item for <u>5 SECONDS</u>. (and does not attempt to use counters, fingers, paper, or pencil) 	
<p><u>Exercise 2</u></p> <p>🧠 There are 6 children on the matatu. [pause and check] 2 are boys. The others are girls. [pause and check] How many girls are there on the matatu?</p> <p><i>Kiswahili: Kuna watoto 6 ndani ya matatu [pumziko]. Wavulana ni 2. Wengineo ni wasichana [pumziko]. Je, kuna wasichana wangapi ndani ya matatu?</i></p>	<p>Correct answer: 4 <u>Circle one:</u></p> <p><input type="checkbox"/> 1 Correct <input type="checkbox"/> 0 Incorrect</p>	<p>Comment: The “[pause and checks]” in each problem indicate that you should be certain that the child understands what you have said before continuing. You may want to ask, “Do you understand?” “<i>Je, unaelewa?</i>”</p>	
<p><u>Exercise 3</u></p> <p>🧠 There are 2 children on John’s matatu. [pause and check] There are 8 children on Mary’s matatu. [pause and check] How many more children must join John’s matatu so that it has the same number of children as Mary’s matatu?</p> <p><i>Kiswahili: Kuna watoto 2 ndani ya matatu ya John [pumziko]. Kuna watoto 8 ndani ya matatu ya Mary, [pumziko]. Je, ni watoto wengine wangapi wanafaa kuingia kwa matatu ya John ili idadi ya watoto wenye wako kwa matatu yake, iwe sawa na ile yenye iko kwa matatu ya Mary?</i></p>	<p>Correct answer: 6 <u>Circle one:</u></p> <p><input type="checkbox"/> 1 Correct <input type="checkbox"/> 0 Incorrect</p>		

<p>Exercise 4</p> <p>☞ There are some children on the matatu. 2 more children get on the matatu. [<i>pause and check</i>] Now there are 9 children on the matatu altogether. [<i>pause and check</i>] How many children were on the matatu at the beginning?</p> <p><i>Kiswahili: Kuna watoto kadhaa ndani ya matatu. Watoto wengine wawili wanaingia ndani ya matatu [pumziko]. Sasa kuna watoto 9 ndani ya matatu kwa jumla [pumziko]. Je, ni watoto wangapi walikuwa ndani ya matatu mwanzoni (Kabla ya wengine kuingia)?</i></p>	<p>Correct answer: 7</p> <p>Circle one:</p> <p><input type="checkbox"/> 1 Correct</p> <p><input type="checkbox"/> 0 Incorrect</p>	<p>🛑 (Stop)</p> <ul style="list-style-type: none"> • If the child gets 4 successive errors <p>➡ (Move on)</p> <ul style="list-style-type: none"> • If a child stops on an item for <u>5 SECONDS</u>. (and does not attempt to use counters, fingers, paper, or pencil) <p>Comment: The “[<i>pause and checks</i>]” in each problem indicate that you should be certain that the child understands what you have said before continuing. You may want to ask, “Do you understand?” “Je, unaelewa?”</p>
<p>Exercise 5</p> <p>☞ There are 12 bananas. [<i>pause and check</i>] 4 children share the bananas equally. [<i>pause and check</i>] How many bananas does each child get?</p> <p><i>Kiswahili: Pana mandizi 12 [pumziko]. Watoto 4 wanagawana mandizi yale kwa kiasi sawa [pumziko]. Je, kila mtoto anapata mandizi mangapi?</i></p>	<p>Correct answer: 3</p> <p>Circle one:</p> <p><input type="checkbox"/> 1 Correct</p> <p><input type="checkbox"/> 0 Incorrect</p>	<p>➡ (Move on)</p> <ul style="list-style-type: none"> • If a child stops on an item for <u>5 SECONDS</u>. (and does not attempt to use counters, fingers, paper, or pencil) <p>Comment: The “[<i>pause and checks</i>]” in each problem indicate that you should be certain that the child understands what you have said before continuing. You may want to ask, “Do you understand?” “Je, unaelewa?”</p>
<p>To solve the problems, the child used [(✓)tick all that apply]:</p> <p><input type="checkbox"/> Solved the problems in his/her head</p> <p><input type="checkbox"/> Fingers</p> <p><input type="checkbox"/> Counters</p> <p><input type="checkbox"/> Tick marks on paper with a pencil</p> <p><input type="checkbox"/> Other (🗨 describe) _____</p>		

Time Ended: _____:_____AM / PM

KENYA EARLY GRADE MATHS ASSESSMENT

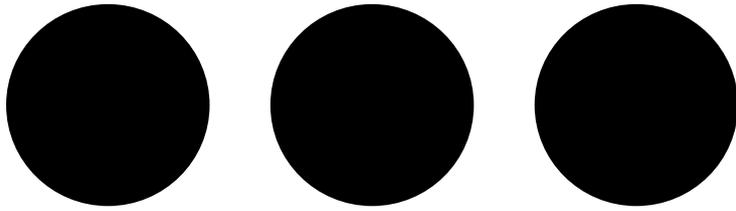
Student Stimuli Booklet Mathematics

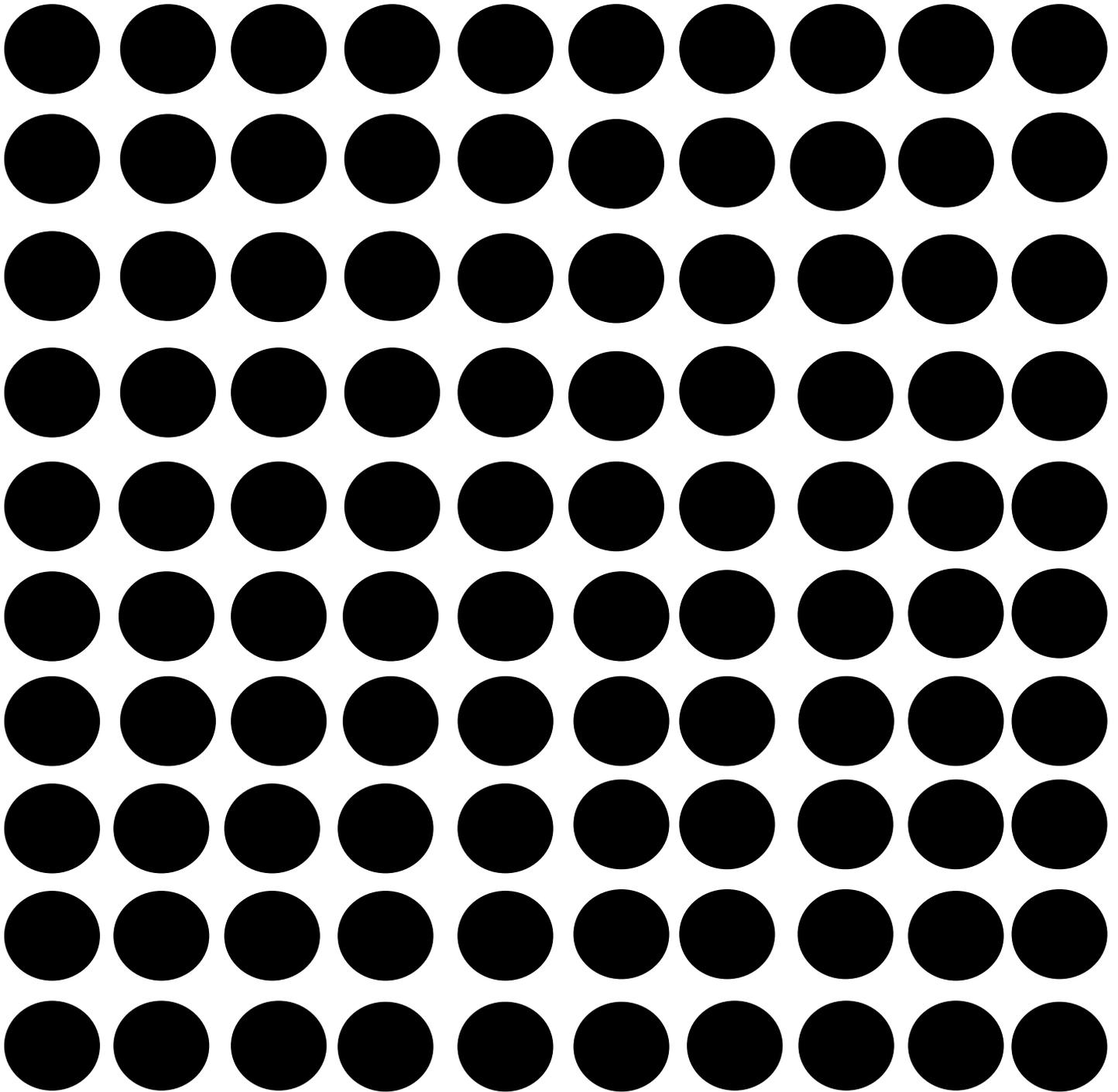
(Baseline)



USAID | **KENYA**
FROM THE AMERICAN PEOPLE







SHEET 2

2	9	0	12	30
22	45	39	23	48
91	33	74	87	65
108	245	587	731	989

8

4

12

22

7

5

11

24

39

23

58

49

65

67

94

78

146

153

287

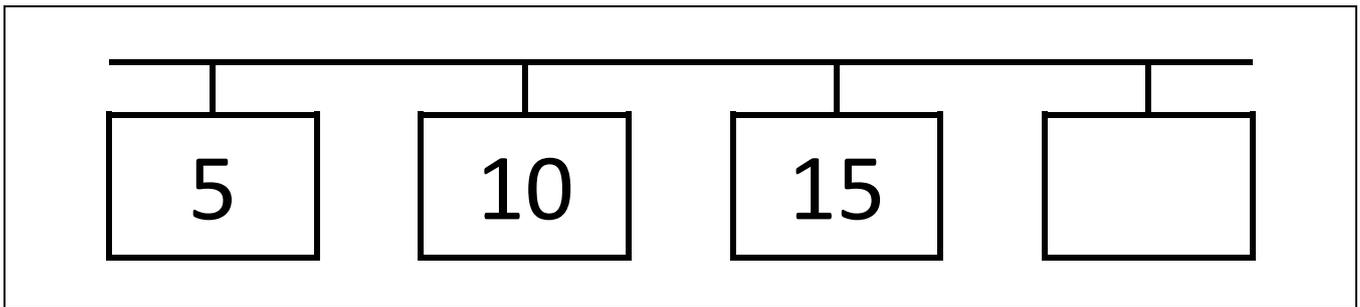
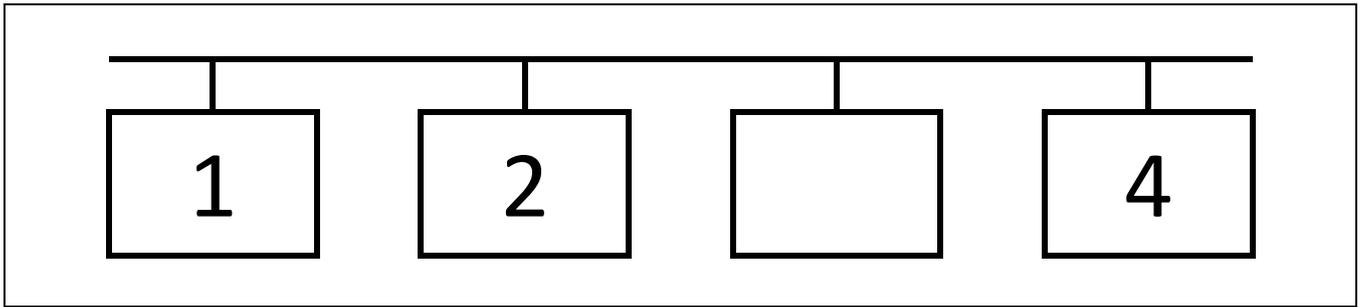
534

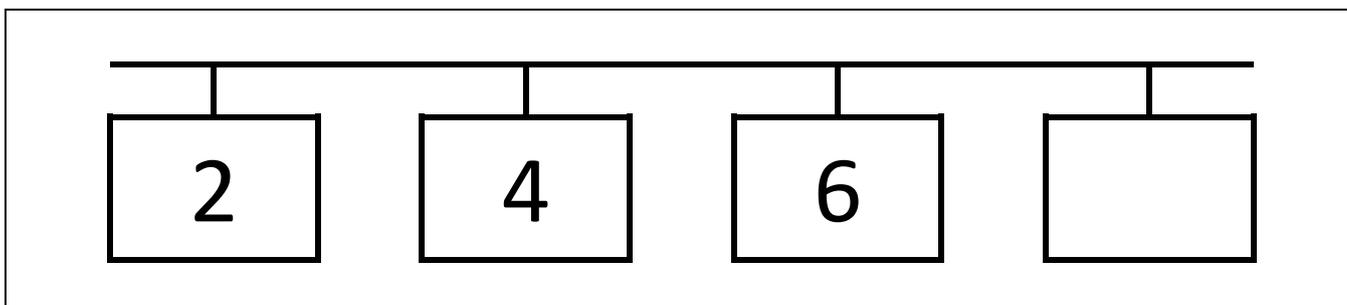
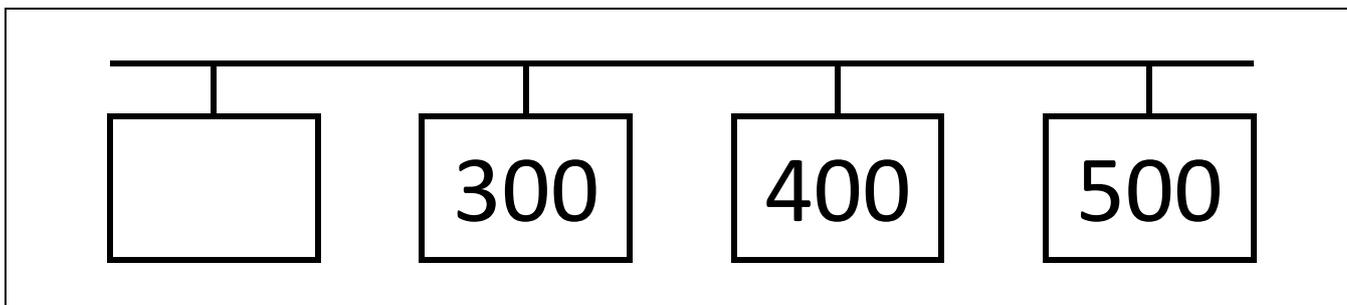
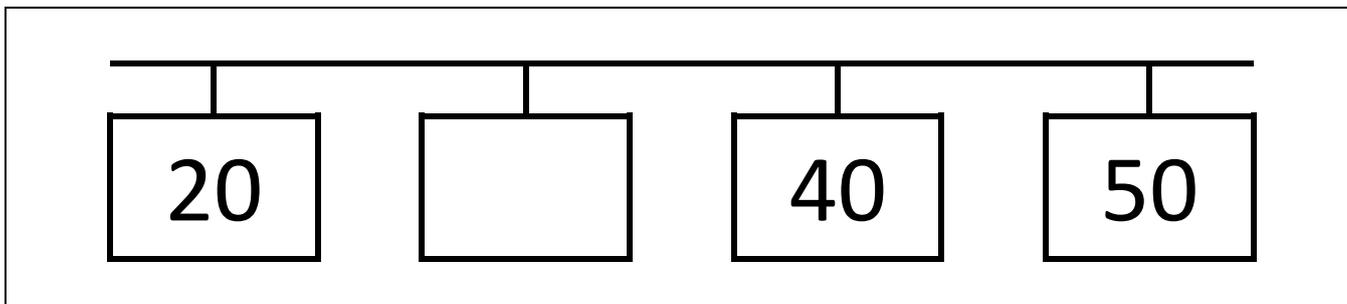
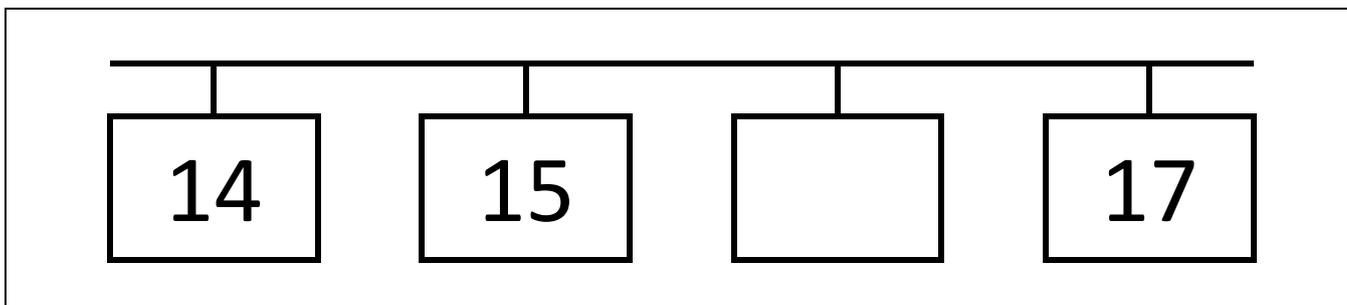
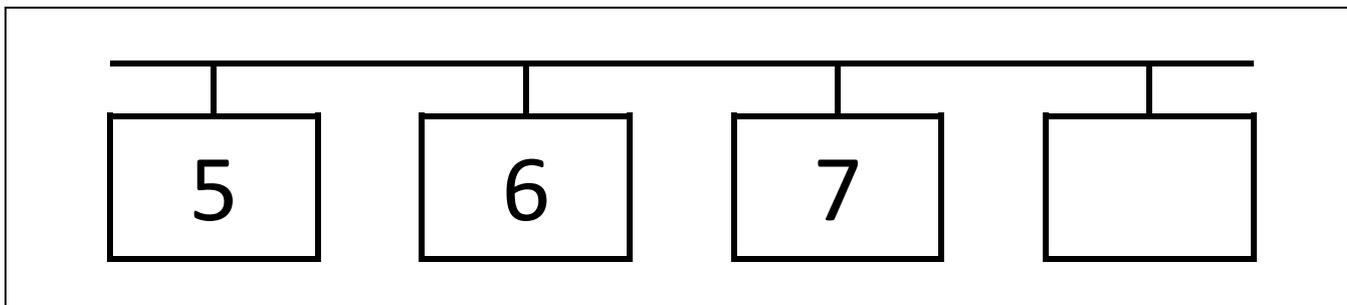
623

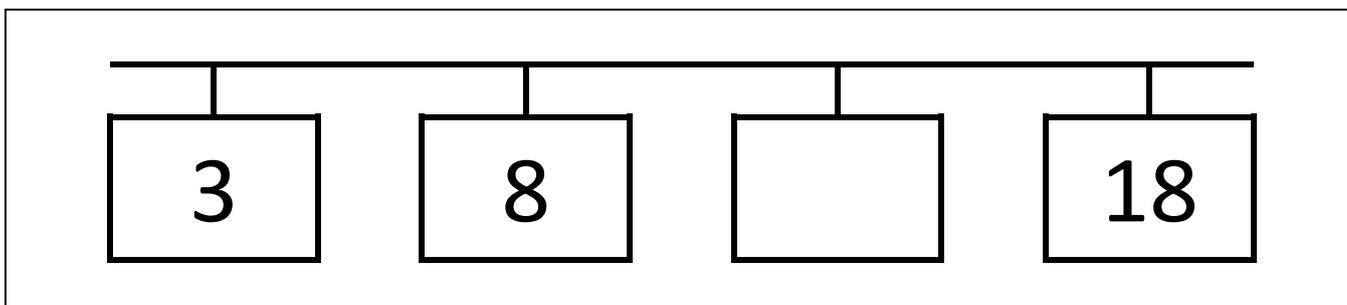
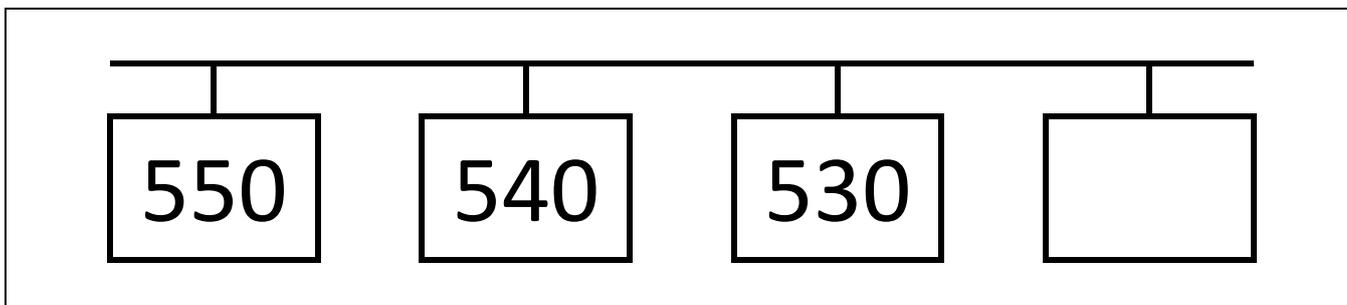
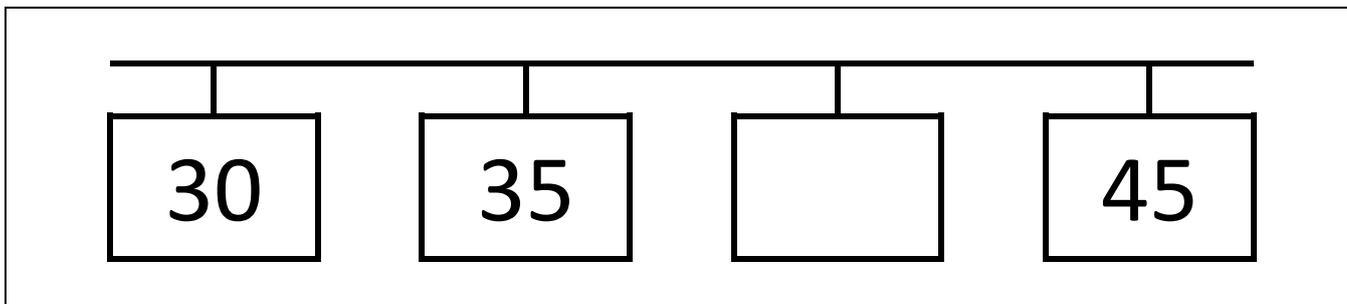
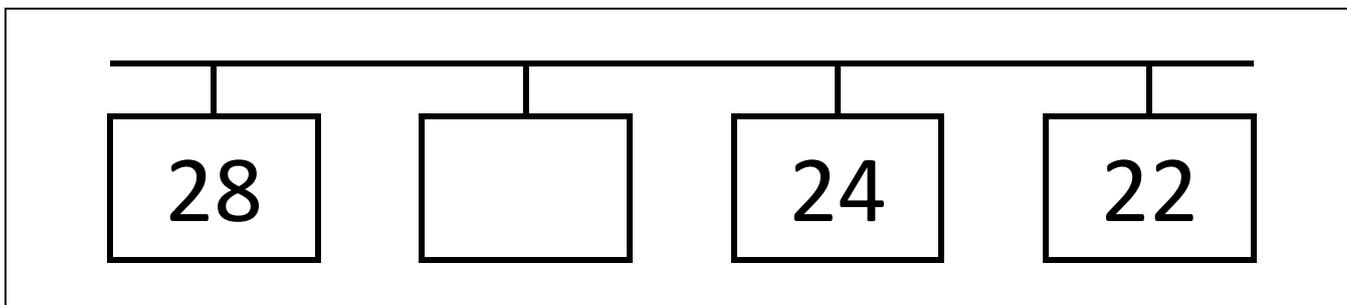
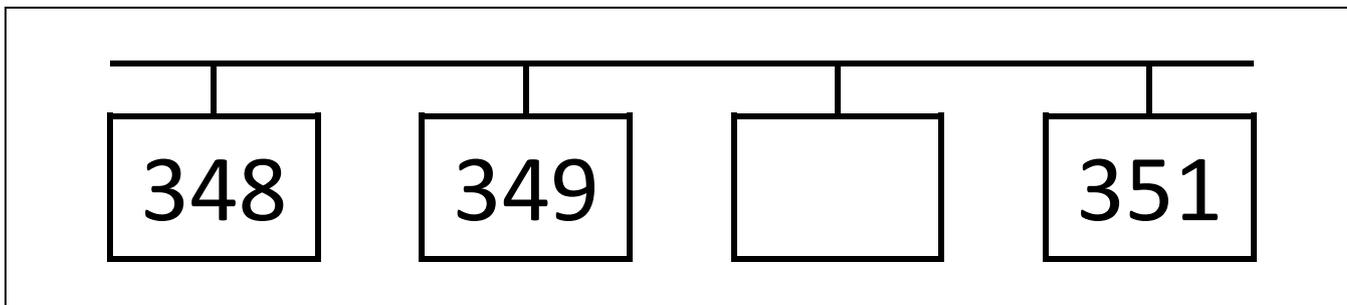
632

867

965







$1 + 3 = \square$

$2 + 3 = \square$

$6 + 2 = \square$

$4 + 5 = \square$

$3 + 3 = \square$

$8 + 1 = \square$

$7 + 3 = \square$

$3 + 9 = \square$

$2 + 8 = \square$

$9 + 3 = \square$

$7 + 8 = \square$

$4 + 7 = \square$

$7 + 5 = \square$

$8 + 6 = \square$

$9 + 8 = \square$

$6 + 7 = \square$

$8 + 8 = \square$

$8 + 5 = \square$

$10 + 2 = \square$

$8 + 10 = \square$

$$13 + 6 = \square$$

$$18 + 7 = \square$$

$$12 + 14 = \square$$

$$22 + 37 = \square$$

$$38 + 26 = \square$$

$$4 - 3 = \square$$

$$5 - 3 = \square$$

$$8 - 2 = \square$$

$$9 - 5 = \square$$

$$6 - 3 = \square$$

$$9 - 1 = \square$$

$$10 - 3 = \square$$

$$12 - 9 = \square$$

$$10 - 8 = \square$$

$$12 - 3 = \square$$

$15 - 8 = \square$

$11 - 7 = \square$

$12 - 5 = \square$

$14 - 6 = \square$

$17 - 8 = \square$

$13 - 7 = \square$

$16 - 8 = \square$

$13 - 5 = \square$

$12 - 2 = \square$

$18 - 10 = \square$

$$19 - 6 = \square$$

$$25 - 7 = \square$$

$$26 - 14 = \square$$

$$59 - 37 = \square$$

$$64 - 26 = \square$$



**Head Teacher Questionnaire
Baseline Survey
KENYA**

- The Ministry of Education and RTI International are collaborating in a study to better understand how children learn. Your school was selected through a process of statistical sampling. We would like your help in giving us some information. But you do not have to take part if you do not want to.
- Your name will not be recorded on this form or mentioned anywhere in the survey data. The results of this survey will be published in the form of collective tables. The information acquired through this instrument will be shared with the Ministry of Education with the hope of identifying areas where additional support may be needed.
- The name of your school and the class level and class you teach will be recorded, but only so that we can correctly link school, class, and student data so as to analyze relationships between children’s learning and the characteristics of the settings in which they learn. The results of analysis will be used by the Ministry of Education and RTI to help identify additional support that is needed.
- If you agree to help with this study, please read the consent statement below, check the “Yes” box, and answer the questions in this questionnaire as completely and accurately as you can, regarding your teaching preparation and activities. It should take you no more than 10 minutes. Return the completed form to the study team before the team leaves your school.

If after reading this message you prefer not to participate, please return this form with no markings to the study team.

CONSENT STATEMENT: I understand and agree to participate in this research study. YES

Please answer all questions truthfully. Write each response in the space on the right across from each item. Where response options are given, clearly circle the number on the far right of the option that corresponds most closely to your response. For example, (3)

1	Name of County	
2	Name of District	
3	Name of Zone	
4	Name of School	
5	Assessor Name	
6	Supervisor Name	
7	Day and Month	Day_____ Month_____
8	What is your position at this school?	Head Teacher 1 Deputy Head teacher 2 Other 3
9	Your gender	Female1 Male 2

10	How many years have you been in this position (as a head teacher or the deputy head teacher)	Years: _____
11	What is your highest level of education?	Graduate1 Approved Teacher Status2 Diploma 3 PI4 PII5 Other, (specify): _____
12	How many hours a week do you teach? (Put zero if none)	Hours: _____ If ZERO, GO TO QUESTION 14
13	What Class do you teach? (Multiple responses allowed)	Standard 1 1 Standard 2 2 Standard 3 3 Standard 4 4 Standard 5 5 Standard 6 6 Standard 7 7 Standard 88
14	How many hours, per week, do you provide instructional support for your teachers?	Hours: _____
15	Have you received special training or taken courses in school management?	Yes 1 No 0 If NO, GO TO QUESTION 18
16	If yes, what was the length of the program?	_____ Days
17	Who initiated this training for you?	MoE invited me1 City Council/Municipal council 2 I initiated it3 Program/Project/Donor 4 Other, (Specify) _____
18	Have you received special training or taken courses preparing you to implement a program in lower primary level reading and maths?	Yes 1 No 0 If NO, GO TO QUESTION 21
19	If yes, what was the length of the program?	_____ Days
20	Who organized this training?	MoE invited me1 City Council/Municipal council2 I initiated it3 Program/Project/Donor 4 Other, (Specify): _____
21	Have you supported teachers on how to teach reading and maths (the pedagogy)?	Yes 1 No 0

22	Are you satisfied with the performance in reading and maths in standard 1 and 2 in your school?	Not satisfied at all1 Satisfied2 Very satisfied3
23	In the last month, on how many days did you have to leave the school during the school day on official school business? (Enter Zero if none)	Days: _____
Information about the school		
24	What is the highest class taught in this school?	Standard _____
25	Does your school use Kiswahili as the medium of instruction for Class 1 and 2?	Yes1 No0
26	Approximately what percentage of actual instruction in Class 1 and 2 is in Kiswahili?	_____ Percent
27	Why does your school not use more Kiswahili in instruction in class 1 and 2?	Explain: _____ _____ _____
28	In your personal view, what should be the appropriate class to begin teaching in English?	Standard 11 Standard 22 Standard 33 Standard 44
29	How many of the teachers have received specific training on teaching reading? (Enter Zero if none)	Number of teachers: _____ IF ZERO GO TO QUESTION 31
30	Who organized this training? (Multiple-responses allowed)	MoE1 City Council/Municipal council1 School..... 1 Program/Project/Donor 1 District.....1 Other, (Specify): _____
31	Since the start of the current school year, was this school closed during the regular school calendar other than holidays?	Yes1 No0 GO TO QUESTION 34
32	If yes, how many days was the school closed?	Number of days: _____
33	If yes, why was the school closed?	Explain: _____ _____ _____
34	Was your school disturbed [affected] by protests or strikes this year?	Yes1 No0 GO TO QUESTION 37
35	If yes, how many days was the school disturbed?	Number of days: _____

36	How many teachers were absent yesterday?	Number of teachers absent: _____ Don't know99
37	How many teachers arrived after the start of classes yesterday?	Number of teachers late: _____ Don't know99
38	Who is responsible for reviewing teachers' lesson plans?	No one0 IF NO ONE, GO TO QUESTION 40 head teacher1 Deputy head teacher2 Other3 Other, (specify): _____
39	How often are these plans reviewed?	Never0 Once per year1 Once every 2-3 months2 Once every month3 Once every two weeks 4 Every week5 Once per day6 Don't Know/No Responses99
40	In your school, who is responsible for observing teachers in their classrooms?	No one observes0 IF NO ONE, GO TO QUESTION 42 Head Teacher1 Deputy Head Teacher2 Other3 If other, specify: _____
41	In a term, how often are you able to observe the teachers in their classrooms?	Never 0 One time1 Two times2 Three Times3 Four or more times4 If other, specify: _____
42	How do you know whether your students are progressing? [DO NOT READ RESPONSES - CIRCLE 1 FOR THOSE MENTIONED]	Yes
		Classroom observation 1 Monitor students' results on tests given by teachers.....1 Evaluate children orally myself1 Review children's assignments or Homework1 Teachers provide me progress reports1 Other1 If other, specify: _____ Don't know/refuse to respond 1

43	Who provides pupils' textbooks in Kiswahili for class 1 & 2? [CIRCLE '1' IF THIS SOURCE WAS MENTIONED]	<p style="text-align: right;">Yes</p> MoE1 City /Municipal council1 School (via independent funds).....1 Parents (individually)1 School Committee or board.....1 Other, (specify): _____ Don't know/refuse to respond 99
44	What is the approximate student to book ratio for Kiswahili in Class 1 and 2	1 to 1.....1 2 to 1.....2 3 to 1.....3 4 to 1.....4 5 to 1 or more.....5 No books.....8 Doesn't know/refuses to respond.....99
45	Who provides pupils' textbooks in English for class 1 & 2? [CIRCLE '1' IF THIS SOURCE WAS MENTIONED]	<p style="text-align: right;">Yes</p> MoE1 City /Municipal council1 School (via independent funds).....1 Parents (individually)1 School Committee or board.....1 Other, (specify): _____ Don't know/refuse to respond 99
46	What is the approximate student to book ratio for English in Class 1 and 2	1 to 1.....1 2 to 1.....2 3 to 1.....3 4 to 1.....4 5 to 1 or more.....5 No books.....8 Doesn't know/refuses to respond.....99
47	Who provides pupils' textbooks in maths for class 1 & 2? [CIRCLE '1' IF THIS SOURCE WAS MENTIONED]	<p style="text-align: right;">Yes</p> MoE1 City /Municipal council1 School (via independent funds).....1 Parents (individually)1 School Committee or board.....1 Other, (specify): _____ Don't know/refuse to respond 99
48	What is the approximate student to book ratio for Maths in Class 1 and 2	1 to 1.....1 2 to 1.....2 3 to 1.....3 4 to 1.....4 5 to 1 or more.....5 No books.....8 Doesn't know/refuses to respond.....99

49	How often did the P.T.A. meet in this past year?	Never0 once a year1 once a term2 once a month3 once a week 4 doesn't know/no response99
50	For which of the following does the PTA have decision making authority and/or responsibility? [CIRCLE 1 (Yes) FOR ALL THAT APPLY] [DON'T READ ALL THE POSSIBLE RESPONSES. SIMPLY CIRCLE 1 FOR EACH RESPONSE GIVEN]	Yes Discuss school management problems? 1 Discuss students' problems and solutions?..... 1 Review progress of school improvement efforts?1 Review financial situation (budgets) of the school1 Manage school infrastructure and equipment?1 Discuss school curriculum?.....1 Raise funds1 Manage procurement or distribution of textbooks?1 don't know/no response 1
51	Is there clean, safe water supply available on school premises?	Yes1 No0
52	Does the school have electricity?	Yes1 No0
53	Does the school have a feeding program?	Yes1 No0
54	Does the school have girls' washroom facilities?	Yes1 No0
55	Does the school have a computer room?	Yes1 No0
56	Does the school have a library?	Yes1 No0
57	What was the school's mean score on the KCPE last year?	Boys Girls MEAN.....

Thank you for your participation! You have been very helpful.



**Teacher Questionnaire
Baseline Survey, 2012
KENYA**

- The Ministry of Education and RTI International are collaborating in a study to better understand how children learn. Your school was selected through a process of statistical sampling. We would like your help in giving us some information. But you do not have to take part if you do not want to.
- Your name will not be recorded on this form or mentioned anywhere in the survey data. The results of this survey will be published in the form of collective tables. The information acquired through this instrument will be shared with the Ministry of Education with the hope of identifying areas where additional support may be needed.
- The name of your school and the class level and class you teach will be recorded, but only so that we can correctly link school, class, and student data so as to analyze relationships between children’s learning and the characteristics of the settings in which they learn. Your school’s name will not be used in any report or presentation. The results of analysis will be used by the Ministry of Education and RTI to help identify additional support that is needed.
- If you agree to help with this study, please read the consent statement below, check the “Yes” box, and answer the questions in this questionnaire as completely and accurately as you can, regarding your teaching preparation and activities. It should take you no more than 10 minutes. Return the completed form to the study team before the team leaves your school.
- If after reading this message you prefer not to participate, please return this form with no markings to the study team.

CONSENT STATEMENT: I understand and agree to participate in this research study. YES

Please answer all questions truthfully. Write each response in the space on the right across from each item. Where response options are given, clearly circle the number on the far right of the option that corresponds most closely to your response. For example,

1	Name of County	
2	Name of District	
3	Name of Zone	
4	Name of School	
5	Assessor Name	
6	Supervisor Name	
7	Class level(s) you are teaching this year (Circle numbers for ALL classes that apply):	Standard 1 1 Standard 2 2 Standard 3 3 Standard 4 4 Standard 5 5 Standard 6 6

		Standard 7 7 Standard 8 8
8	Name of Class(s) and Stream(s):	Class: _____ Stream: _____
9	Your gender:	Male 1 Female 2
10	Enrolment of your class (indicate numbers by gender)	Number of boys: _____ Number of girls: _____
11	Your age at last birthday (years)	_____ years
12	What are your professional qualifications?	Not qualified.....0 P1 1 Diploma / S1 2 Bachelors' of Education 3 Other (specify: _____)..... 4
13	How many years of education do you have?	_____ years
14	How many years have you been teaching overall?	_____ years
15	How many years have you taught at this school?	_____ years
16	Does your school have a Library?	No..... 0 Yes..... 1 Don't know 9 If "No" or "Don't Know" skip to 16
17	Approximately how many book titles are in the library?	_____ book titles
18	Do you have sufficient teaching materials?	No..... 0 Yes..... 1 Don't know 9
19	Does your school have a functioning Parent / Teacher Association?	No..... 0 Yes..... 1 Don't know 9
20	Approximately, how long do you take to travel to school?	Stay within the school compound.....0 15 minutes or less 1 16 to 30 minutes 2 31 to 45 minutes 3 46 to 60 minutes 4 More than 60 minutes 5

21	How often does a head teacher, TAC tutor or District official observe you teaching in your classroom?	About once per week 1 About once per month..... 2 About once per term..... 3 About once per year 4 Never 5
22	How many days of in-service training or professional development sessions on any topic have you attended during the last 3 years? If none put a “zero”	Days: _____
23	How many days of in-service training or professional development sessions on teaching Kiswahili have you attended during the last 2 years? If none put a “zero”	Days: _____
24	How many days of in-service training or professional development sessions on teaching English have you attended during the last 2 years? If none put a “zero”	Days: _____
25	How many days of in-service training or professional development sessions on teaching Maths have you attended during the last 2 years? If none put a “zero”	Days: _____
26	If yes to Question 23, 24 or Question 25, what was the most useful aspect of those trainings?	

Which of the following methods do you use to measure your pupils’ maths/reading progress? Indicate how often you use each method by circling the number on the right that corresponds to the closest

frequency:

		Never	1 day a week	2 days a week	3 days a week	4 days a week	5 days a week
27	Written assessments	0	1	2	3	4	5
28	Oral evaluations	0	1	2	3	4	5
29	Checking of exercise books	0	1	2	3	4	5
30	Checking of homework	0	1	2	3	4	5
31	Other methods (please describe):						

Instructions: Only complete the column for the subjects the teacher teaches. (Maths, Kiswahili or English). Many teachers teach all three.				
		English (a)	Kiswahili (b)	Maths (c)
32	Write the title of the main textbook used for each subject: I don't have the Textbook.....8 Skip to 35 I don't have the Textbook.....8 Skip to 35 I don't have the Textbook.....8 Skip to 35
33	How often do you use the text mentioned in Q32 during the lessons?	Never.....0 One day per week1 Two days per week2 Three days per week3 Four days per week.....4 Five days per week 5	Never.....0 One day per week1 Two days per week2 Three days per week3 Four days per week.....4 Five days per week 5	Never.....0 One day per week1 Two days per week2 Three days per week3 Four days per week.....4 Five days per week 5
34	How useful do you find this Text?	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful 4 Very useful5	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful 4 Very useful5	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful 4 Very useful5
35	Do you have a teacher's guide for:	No0 Skip to 37 Yes1	No0 Skip to 37 Yes1	No 0 Skip to 37 Yes 1
36	How useful do you find this guide?	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful 4 Very useful5	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful 4 Very useful5	Not useful 1 A little bit useful 2 Somewhat useful 3 Useful4 Very useful5
37	Please show me the scheme of work for this subject	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9
38	Please show me the lesson plan for this subject	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9	Doesn't have it.....1 Not well prepared.....2 Reasonably well prepared.....3 Well prepared.....4 Refuses/No response.....9

Following are different activities you might do with your pupils during a lesson. Think about the last 5 school days and indicate how often each of the following activities took place,

by circling the number on the right that corresponds to the closest frequency:

		Never	1 day a week	2 days a week	3 days a week	4 days a week	5 days a week
39	The whole class repeated sentences that you said first.	0	1	2	3	4	5
40	Pupils copied down text from the chalkboard.	0	1	2	3	4	5
41	Pupils retold a story that they read.	0	1	2	3	4	5
42	Pupils sounded out unfamiliar words.	0	1	2	3	4	5
43	Pupils learned meanings of new words.	0	1	2	3	4	5
44	Pupils read aloud to teacher or to other pupils.	0	1	2	3	4	5
45	Pupils were assigned reading to do on their own during school time.	0	1	2	3	4	5
46	The whole class repeated numbers written on a chart or chalkboard after you	0	1	2	3	4	5
47	Pupils copied maths problems from the chalkboard	0	1	2	3	4	5
48	Pupils were assigned maths problems to do at home.	0	1	2	3	4	5
49	Pupils worked out maths problems in groups.	0	1	2	3	4	5

In what class should pupils FIRST be able to demonstrate these skills?

		Before Std 1	St 1	St 2	St 3	St4 or later
50	Read aloud a short passage with few mistakes	0	1	2	3	9
51	Write name	0	1	2	3	9
52	Understand stories they read	0	1	2	3	9
53	Recognize letters and say letter names	0	1	2	3	9
54	Sound out unfamiliar words	0	1	2	3	9
55	Understand stories they hear	0	1	2	3	9
56	Recite alphabet	0	1	2	3	9
57	Count numbers up to 100	0	1	2	3	9
58	Add and subtract one-digit numbers	0	1	2	3	9
59	Add and subtract two-digit numbers	0	1	2	3	9
60	Multiply one digit numbers	0	1	2	3	9
61	Recognize and identify basic shapes.	0	1	2	3	9

Thank you for your participation! You have been very helpful.

		Observation #:										
		Page	3	6	9	12	15	18	21	24	27	30
A) Teacher focus: (only one X)												
COR13	Whole class											
COR14	Small Group											
COR15	One individual student											
COR16	Other / Not focusing on students											
COR17	Teacher not in the room											
B) Instructional Content: (only one X)												
COR18	Spelling											
COR19	Grammar											
COR20	Reading isolated words											
COR21	Reading sentences											
COR22	Vocabulary (word meanings)											
COR23	Writing/dictation											
COR24	Reading texts											
COR25	Reading comprehension – text											
COR26	Writing – creating texts											
COR27	Other or don't know											
C) Teacher Action (Language) (E=English; K=Kiswahili; O=Other)												
COR28	Reading out loud											
COR29	Writing											
COR30	Explaining											
COR31	Speaking											
COR32	Listening to student(s)											
COR33	Monitoring students											
D) Student actions (Language) (E=English; K=Kiswahili; O=Other)												
COR34	Choral reading											
COR35	Individual reading out loud											
COR36	Silent reading											
COR37	Writing on paper or individual slate (chalkboard)											
COR38	writing on blackboard											
COR39	Speaking											
COR40	Listening to/watching the teacher											
COR41	Repeating/Recitation											
COR42	Other (Projects, games, etc....)											
COR43	Off task (talking, sleeping, playing)											
E) Materials used (Language) (E=English; K=Kiswahili; O=Other)												
COR45	Blackboard											
COR46	Textbook											
COR47	Other book											
COR48	Papers (worksheets or photocopies)											
COR49	Flashcards											
COR50	Posters/Wall charts											
COR51	Slates											
COR52	Student notebooks											
COR53	Other											



Classroom Observation – Early Grade Mathematics

COM1 District:
COM2 Zone:
COM3 School:
COM4 Assessor Name:
COM5 Supervisor Name:
COM6 Quality Assurer Code:
COM7 Quality Assurer Signature:

The observation form should be completed in class during a mathematics lesson. If the teacher indicates that there is not a separate mathematics lesson, ask to observe a lesson that focuses on mathematics.

When arriving to class, find a seat at the back of the class. Try not to interrupt or disturb the class.

Complete the observation table. Every three minutes, indicate the teacher focus, teacher content, student and teacher action, and teaching material used at the moment of observation. In sections A and B indicate the teacher focus and teacher content by placing an “X” by the observed item. In sections C and D, indicate the teacher and student action and the language being used by placing the appropriate language code by the observed action. In section E, indicate the material and the language being used by placing the appropriate language code by the material used at the moment of observation. Every section (A, B, C, D, and E) must have at least one mark for each “Snapshot”. Don’t forget to write in the time of the beginning of the observation.

After the observation is complete, answer the following questions:

	In order to get a sense of the number of textbooks available please ask the children to hold up the textbook for the current subject.	
COM9	Number of children with text book for current subject	
COM10	Does the teacher have a book for this class?	1= Yes 2= No
COM11	If yes, ask the teacher to show you the Text Book he or she is using	
COM11.1	How many chapters has the class covered so far this year?	
COM11.2	How many chapters are there in this book?	
COM12	Start time -----Hr.....Min	

NOTES:



USAID | KENYA
FROM THE AMERICAN PEOPLE



KENYA PRIMR

CLASSROOM INVENTORY INSTRUMENT

Label

CIN1 County:
CIN2 District:
CIN3 Zone:
CIN4 School:
CIN5 Assessor Name:
CIN6 Supervisor Name:
CIN7 Quality Assurer Signature:

CIN9	Starting Time	_____ : _____ (AM / PM)
CIN10	Interview Date	Date of Interview D D M M Y Y <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
CIN11	Is the classroom clean and neat?	No 0 Yes 1
CIN12	Is there sufficient light in the room?	No 0 Yes 1
CIN13	Is there a ceiling?	No 0 Yes 1

Classroom Inventory Instrument

CIN14	Are there students sitting on the floor? How many?	None 0 A few 1 About half 2 Almost all 3 All 4				
CIN15	Are there sufficient chairs/desks for all the students?	No 0 Yes 1				
CIN16	Are all the desks designed for one or two students?	No 0 Yes 1				
CIN17	Is there enough space in the class for the teacher to circulate freely?	No 0 Yes 1				
CIN18	Indicate what desk or bench arrangement is used in this classroom	Rows 0 small groups 1 circle 2 other (describe) 3				
CIN19	How many boys are present in this classroom at the time of your observation? [HAVE ALL THE BOYS STAND AND COUNT THEM]	Boys <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>				
CIN20	How many girls are present in this classroom at the time of your observation? [HAVE ALL THE GIRLS STAND AND COUNT THEM]	Girls <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>				
Materials [TASK CHILDREN TO RAISE EACH TYPE OF MATERIAL IN THE AIR ONE BY ONE]:						
CIN20.1	Number of children with exercise book	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>				
CIN20.2	Number of children with pen/ pencil					
CIN21	Does the teacher have the following materials? [CIRCLE ALL THE MATERIALS THAT THE TEACHER HAS]	Chalkboard 1 Whiteboard 1 blackboard/whiteboard 1 Pen/Pencil 1 Notebook 1 Teacher Manual (current subject) 1				
CIN21.1						
CIN21.2						
CIN21.3						
CIN21.4						
CIN21.5						
CIN21.6						
CIN22	[If there is a chalkboard] Is the chalkboard in good condition?	No 0 Yes 1				

Classroom Inventory Instrument

Are the following materials available/accessible (not locked away) for children to read?			
CIN23	Books/booklets other than textbooks	None	0
		1-4	1
		5-9	2
		10-19	3
		20-39	4
		40+	5
CIN24	Magazines	None	0
		1-4	1
		5-9	2
		10-19	3
		20-39	4
		40+	5
CIN25	Are there posters on the walls	No	0
		Yes	1
CIN26	Are there posters specifically about health and/or safety?	No	0
		Yes	1
CIN27	Are there teacher made displays/resources visible?	No	0
		Yes	1
CIN28	Is students' work displayed on the walls?	No	0
		Yes	1

Annex B. Summary Statistics

Table B-1. PRIMR baseline findings, by class: English, Kiswahili, and Mathematics

	Subtask	Class	Mean	Std. Dev.	Std. Error	Min.	Q1	Median	Q3	Max.	Lower CI	Upper CI	
English	Letter fluency	1	18.35	17.93	1.50	0	0	14	30	81	15.28	21.41	
		2	19.97	18.59	1.36	0	0	16	32	91	17.19	22.76	
	Nonword fluency	1	6.36	9.77	0.69	0	0	0	12	50	4.95	7.78	
		2	14.92	13.62	0.91	0	0	14	25	50	13.06	16.78	
	Oral reading fluency	1	5.17	11.36	0.67	0	0	0	4	57	3.80	6.55	
		2	19.83	19.65	1.42	0	0	14	37	59	16.93	22.73	
	Reading comprehension	1	0.16	0.57	0.02	0	0	0	0	5	0.11	0.21	
		2	0.80	1.22	0.07	0	0	0	1	5	0.65	0.95	
	Untimed oral reading fluency	1	6.23	11.11	0.78	0	0	0	10	38	4.64	7.83	
		2	17.86	14.09	1.02	0	0	21	32	38	15.76	19.95	
	Untimed reading comprehension	1	0.20	0.63	0.04	0	0	0	0	4	0.13	0.27	
		2	0.72	1.02	0.06	0	0	0	1	4	0.59	0.84	
	Kiswahili	Letter fluency	1	12.78	10.78	0.80	0	4	12	19	62	11.13	14.43
			2	17.37	11.68	0.66	0	8	16	24	94	16.01	18.73
Nonword fluency		1	3.14	6.79	0.37	0	0	0	3	42	2.39	3.89	
		2	10.98	10.95	0.65	0	0	9	20	50	9.65	12.31	
Oral reading fluency		1	3.75	8.39	0.46	0	0	0	2	56	2.79	4.70	
		2	15.67	15.36	1.09	0	0	13	29	56	13.44	17.89	
Reading comprehension		1	0.27	0.70	0.03	0	0	0	0	5	0.20	0.34	
		2	1.15	1.25	0.08	0	0	1	2	5	0.99	1.31	
Untimed oral reading fluency		1	6.29	12.31	0.69	0	0	0	5	41	4.89	7.70	
		2	20.53	16.27	1.17	0	0	28	36	41	18.14	22.92	
Untimed reading comprehension		1	0.28	0.61	0.03	0	0	0	0	4	0.21	0.34	
		2	0.91	0.92	0.06	0	0	1	2	4	0.78	1.03	
Listening comprehension		1	1.43	1.28	0.10	0	0	1	2	5	1.24	1.63	
		2	2.26	1.34	0.09	0	1	2	3	5	2.07	2.45	
Mathematics	Number identification	1	9.18	5.46	0.44	0	4	10	14	20	8.29	10.08	
		2	13.84	3.79	0.25	0	13	15	15	20	13.33	14.36	
	Quantity discrimination	1	2.80	2.36	0.12	0	1	3	4	10	2.56	3.04	
		2	5.00	2.38	0.14	0	3	5	6	10	4.72	5.28	
	Missing number	1	1.65	1.12	0.06	0	1	2	2	10	1.52	1.77	
		2	2.78	1.38	0.06	0	2	3	4	10	2.65	2.91	
	Word problems	1	0.68	0.94	0.05	0	0	0	1	4	0.58	0.77	
		2	1.24	1.11	0.06	0	0	1	2	5	1.12	1.36	
	Addition fluency (level 1)	1	3.11	3.48	0.24	0	0	2	5	17	2.61	3.60	
		2	6.88	3.97	0.18	0	4	7	10	20	6.52	7.24	
	Addition fluency (level 2)	1	0.32	0.82	0.05	0	0	0	0	5	0.21	0.43	
		2	0.81	1.18	0.06	0	0	0	1	5	0.69	0.92	
	Subtraction fluency (level 1)	1	1.36	2.52	0.12	0	0	0	2	15	1.12	1.61	
		2	4.07	3.52	0.18	0	0	4	7	17	3.70	4.44	
Subtraction fluency (level 2)	1	0.18	0.68	0.04	0	0	0	0	5	0.10	0.27		
	2	0.42	0.91	0.06	0	0	0	0	5	0.30	0.53		

CI = Confidence interval

Q1 = 25th percentile

Q3 = 75th percentile

Table B-2. PRIMR baseline findings, by sex: English, Kiswahili, and mathematics

	Subtest	Sex	Mean	Std. Dev.	Std. Error	Min.	Q1	Median	Q3	Max.	Lower CI	Upper CI	
English	Letter fluency	Male	18.25	17.26	1.34	0	0	14	30	87	15.50	20.99	
		Fem	20.19	19.37	1.45	0	0	17	34	91	17.21	23.16	
	Nonword fluency	Male	10.10	12.17	0.76	0	0	5	18	50	8.55	11.65	
		Fem	11.61	13.35	0.82	0	0	7	20	50	9.92	13.30	
	Oral reading fluency	Male	11.97	17.13	1.03	0	0	0	20	59	9.87	14.07	
		Fem	13.75	18.83	1.14	0	0	2	23	59	11.41	16.09	
	Reading comprehension	Male	0.46	0.96	0.04	0	0	0	0	5	0.37	0.54	
		Fem	0.53	1.11	0.06	0	0	0	0	5	0.41	0.65	
	Untimed oral reading fluency	Male	11.55	13.76	0.90	0	0	0	26	38	9.70	13.40	
		Fem	13.12	14.39	0.88	0	0	6	28	38	11.32	14.93	
	Untimed reading comprehension	Male	0.45	0.87	0.04	0	0	0	1	4	0.37	0.53	
		Fem	0.49	0.93	0.06	0	0	0	1	4	0.38	0.60	
	Kiswahili	Letter fluency	Male	14.95	11.26	0.69	0	6	14	22	94	13.54	16.35
			Fem	15.43	11.79	0.77	0	6	15	22	67	13.86	16.99
Nonword fluency		Male	6.62	9.64	0.48	0	0	0	12	50	5.63	7.61	
		Fem	7.89	10.53	0.55	0	0	1	15	50	6.77	9.02	
Oral reading fluency		Male	9.16	13.37	0.73	0	0	0	16	56	7.67	10.66	
		Fem	10.84	14.65	0.87	0	0	1	19	56	9.05	12.63	
Reading comprehension		Male	0.66	1.08	0.05	0	0	0	1	5	0.56	0.77	
		Fem	0.80	1.17	0.07	0	0	0	2	5	0.66	0.93	
Untimed oral reading fluency		Male	12.75	15.88	0.94	0	0	0	30	41	10.82	14.68	
		Fem	14.78	16.59	0.94	0	0	1	33	41	12.85	16.71	
Untimed reading comprehension		Male	0.58	0.86	0.05	0	0	0	1	4	0.48	0.67	
		Fem	0.64	0.86	0.05	0	0	0	1	4	0.54	0.73	
Listening comprehension		Male	1.90	1.35	0.09	0	1	2	3	5	1.71	2.09	
		Fem	1.83	1.41	0.10	0	1	2	3	5	1.64	2.03	
Mathematics	Number identification	Male	11.49	5.21	0.36	0	7	14	15	20	10.76	12.23	
		Fem	11.76	5.15	0.31	0	8	14	15	20	11.11	12.40	
	Quantity discrimination	Male	3.99	2.59	0.13	0	2	4	6	10	3.73	4.25	
		Fem	3.92	2.64	0.13	0	2	4	6	10	3.66	4.18	
	Missing number	Male	2.24	1.41	0.07	0	1	2	3	10	2.09	2.38	
		Fem	2.25	1.38	0.05	0	1	2	3	10	2.13	2.36	
	Word problems	Male	1.00	1.09	0.05	0	0	1	2	5	0.89	1.11	
		Fem	0.95	1.06	0.05	0	0	1	2	5	0.85	1.04	
	Addition fluency (level 1)	Male	5.22	4.26	0.19	0	1	5	9	20	4.82	5.62	
		Fem	4.94	4.14	0.19	0	1	5	8	19	4.54	5.33	
	Addition fluency (level 2)	Male	0.62	1.09	0.06	0	0	0	1	5	0.49	0.74	
		Fem	0.61	1.09	0.04	0	0	0	1	5	0.52	0.69	
	Subtraction fluency (level 1)	Male	2.82	3.43	0.16	0	0	1	5	17	2.50	3.14	
		Fem	2.74	3.35	0.13	0	0	1	5	15	2.48	3.01	
Subtraction fluency (level 2)	Male	0.36	0.86	0.05	0	0	0	0	5	0.26	0.47		
	Fem	0.33	0.86	0.04	0	0	0	0	5	0.24	0.42		

CI = Confidence interval

Q1 = 25th percentile

Q3 = 75th percentile